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Paradidactic Books and Statistics Teaching: an analysis of the Brazilian publishing market for the early years of elementary school

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Abstract: This study aimed to map and analyze the editorial design and publishing projects of supplementary textbooks for teaching Statistics in the early years of Elementary Education (ages 6 to 10) within the Brazilian publishing context, investigating their role as pedagogical resources in the teaching-learning process. No prior timeframe was established in order to fully capture the diversity and historical evolution of such publications. The methodology used in the research was documentary, focusing on the analysis of textbooks that focused on statistical concepts aimed at the early years of elementary school. In this way, an online consultation was carried out on the Google search site, in addition to texts that addressed the use of textbooks aimed at teaching statistics available in the Brazilian publishing market and/or on sites selling used or new books. It is observed that the approaches to statistical content are relevant to the initial years of elementary school and are carried out in light, humorous language, attractive to students aged 6 to 10. From this it becomes possible to suggest some of the intervention capabilities that paradidactics can offer to the teaching of statistics. It is concluded that these have been presented as an object to encourage and establish a broad and fertile debate between students and teachers due to their material and incorporeal characteristics.

Keywords: paradidactic book; teaching statistics; elementary school; multivariate textual analysis.

1 Introduction

The Law of Directives and Bases of National Education (LDB), No. 9,394/96, in its Article 32, item I, establishes the need to develop the capacity to learn through the mastery of reading, writing, and calculation. To fulfill this precept, didactic situations in Basic Education must focus on the formation of competent readers through interdisciplinary work. Thus, students are encouraged to assume the role of subjects of their own learning (Brazil, 1996).

Complementing the need for this formation, the National Common Curricular Base (BNCC) (Brazil, 2018) indicates that contact with stories, tales, fables, poems, and *corde* literature is fundamental. This interaction fosters familiarity with different literary genres, in addition to promoting the differentiation between illustrations and writing, as well as learning the directionality and handling of books. Through these



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experiences, students begin to recognize reading as a genuine source of pleasure and information.

Furthermore, within the production of teaching materials are paradidactic books, a more recent term used as a criterion for classifying works in the catalogs of the country's publishers and within the scope of academic research. According to Munakata (1997), "paradidactic" is a typically Brazilian expression, although books with similar characteristics and uses can be found in other countries, which motivated their publication in Brazil in the 1980s.

As an illustration of this dynamic, one must observe the contextualization of the Brazilian publishing market: the term "paradidactic" emerged in the mid-1970s, a period during which the production of books for school purposes intensified in the country. These sector transformations are widely analyzed in the studies by Rangel (2014).

Additionally, Laguna (2012) indicates that paradidactic books arose from discussions regarding the need for Brazilian authors to publish teaching materials for children and young adults, seeking to cultivate, through them, the desire, taste, and pleasure of reading. Consequently, publishers in the Brazilian publishing market began to invest in alternative texts, with more accessible themes and language, which would serve to introduce students to the universe of reading and prepare them for more complex works.

Ciabotti and Oliveira Júnior (2019) reiterate that the growing presence of paradidactic materials in educational institutions reflects the guidelines established by the LDB (Brazil, 1996) and the National Curricular Parameters [*Parâmetros Curriculares Nacionais*] (PCNs) (Brazil, 1998). By addressing transversal contents often overlooked by traditional textbooks, these works constitute highly valuable pedagogical resources. Their strategic use not only supports teacher planning but also fosters the development of critical thinking and civic awareness in students, mediating a deeper relationship between the subject and social reality.

Paradidactic books can be defined as materials that, although not strictly didactic in nature, are frequently used for this purpose. According to Menezes (2001), the relevance of these resources lies in their ability to incorporate pedagogical elements through more playful approaches than those found in traditional manuals.

From this perspective, Oliveira Júnior and Ciabotti (2018) highlight that such works are usually structured as fictional narratives. This characteristic stimulates the reader's attention by presenting mathematical content from a more pleasant, playful, and imaginary viewpoint, making learning potentially more attractive.

To understand the structuring of these materials, it is necessary to clarify the concept of an editorial project. According to Denardi (2022), it is a document that strategically organizes a communication vehicle, such as blogs, newspapers, or magazines, and is essential for supporting and documenting publication decisions. In the educational context, this concept extends to the development of textbooks, paradidactic books, activity workbooks, and teacher guides.

Based on these premises, this study aimed to map and analyze the editorial projects of paradidactic books focused on teaching Statistics in the early years of Elementary School (6 to 10 years old) within the Brazilian market, investigating their characterization as pedagogical resources in the teaching and learning process. The absence of a prior temporal delimitation is justified by the intention to comprehensively capture the evolution and diversity of these publications, without restricting the identification of available materials.

2 Theoretical Framework: dialogues and convergences

According to Costa and Rodrigues (2015), paradidactic books function as a magical space of unveiling. Upon reading them, children blend their imagination with the stimulus of the work, adopting the book as a realm of pleasure. In this comfortable environment, fantasy and emotions intertwine and dialogue, allowing the young reader to explore new conflicts. As a result, forms and norms emerge that foster cognitive and affective development.

Considering paradidactic works as a form of narrative or literature, they also embody, according to Frantz (2005), playfulness, fantasy, and questioning. In this way, they assist students in finding answers to the numerous inquiries about their world, enriching their capacity to perceive both the concepts presented to them and the proposed themes.

Regarding mathematics education, Piano and Ripardo (2022) consider paradidactic books to be educational resources with diverse potential for pedagogical

practices, converging across different modalities of language (oral, written, and visual). They are generally highlighted as methodological resources that support mathematics learning through reading and textual interpretation, enabling the exploration of ideas and concepts that permeate the mobilization of skills and competencies within this field of knowledge.

Furthermore, the use of paradidactic books allows students to autonomously dictate the pace of their own learning. In this process, the learner assumes an active role in knowledge construction, given that the material is intended to teach in a playful manner. According to Dalcin (2007), this effectiveness lies in the articulation of mathematical symbolism with images and words.

Specifically regarding statistics education tailored to the early years of Elementary Education, Oliveira Júnior and Santos (2022) analyzed Brazilian literature that utilized or developed paradidactic books. Thirteen studies published between 2002 and 2021 were identified, revealing that research targets both students and teachers across the early and final years of Elementary Education, primarily conducted within graduate programs and their respective research groups. Considering that such research remains incipient, the need for further investigation, particularly at the doctoral level, is evident. In addition, the findings indicate a trend toward establishing connections with experiential and everyday knowledge, contributing to the formation of citizens who are conscious of the development of statistics.

3 Methodological Procedures

The present study consisted of a Systematic Narrative Literature Review (SNR), which, according to Siddaway, Wood, and Hedges (2019), is appropriate when the studies under consideration employ diverse methodologies or stem from different theoretical conceptualizations, constructs, and/or relationships. Narrative reviews are a particularly useful means of bringing together studies on different topics for reinterpretation or interconnection and can be used to provide a historical overview of the development of theory and research on a topic.

Furthermore, the research was conducted based on the guidelines proposed by Kitchenham and Charters (2007) for Systematic Literature Reviews (SLR), which comprise three main stages: planning, execution, and reporting of results. In the

planning phase, a protocol was developed to search for books within the Brazilian publishing market whose proposals addressed statistical concepts aimed at the early years of Elementary Education.

This phase established the procedure for conducting the review, the research question formulated, as well as the search strategies, inclusion and exclusion criteria, and data collection and analysis methods. In the second phase, the process focused on the execution of the review protocol. Finally, in the third phase (reporting results) this final report was drafted.

Regarding the methodological procedures, documentary research was selected. The analysis prioritized paradidactic books that integrate the teaching of Statistics, specifically those aimed at the early years of Elementary Education, seeking to understand the didactic approach utilized.

Thus, online data prospecting was conducted to map the supply of paradidactic Statistics books. The investigation encompassed the catalogues of national publishers and online bookselling platforms, covering both in-print works and titles available in online secondhand bookstores. Keywords were used in combination with the term *Paradidactic Book* as the primary option (AND) *Statistics* (AND) *Elementary Education* (AND) *Education*.

The criteria adopted to compose the corpus were: (a) books classified as paradidactic in their editorial presentation; (b) books utilized in scientific publications that classified them as paradidactic; and (c) the researchers' prior knowledge regarding the use of such books as paradidactic material.

Following the retrieval of the works through the application of the aforementioned descriptors and criteria, the presentations of the volumes were examined. Linguistic and thematic boundaries were established as inclusion criteria: works published in the Brazilian publishing market, written in Portuguese, that specifically addressed the teaching of Statistics in the early years of Elementary Education.

Exclusion criteria comprised works that did not align with the theme specified in the inclusion criteria. Finally, a complete reading of the books considered paradidactic was conducted, resulting in ten publications that present statistical concepts targeted at the early years of Elementary Education (Table 1).

Table 1 – Paradidactic books aimed at teaching Statistics in the early years of Elementary Education published in the Brazilian publishing market

Paradidactic	Author (Year)	Title	Content (School cycle)
P1	Lopes (1997)	Information Processing - Exploring statistical data and probability notions from early grades [Tratamento da Informação - Explorando dados estatísticos e noções de probabilidade a partir das séries iniciais]	Probability and Statistics (starting from the early years of Elementary School)
P2	Smoothey (1998)	Activities and Games with Statistics [Atividades e jogos com Estatística]	Statistics (Elementary School)
P3	Imenes, Lellis and Jakubo (2001)	Statistics: What is Mathematics for? [Estatística: Pra que serve a Matemática?]	Statistics (final years of Elementary School)
P4	Lopes (2002)	Information Processing – Activities for Basic Education [Tratamento da Informação – Atividades para o Ensino Básico]	Probability and Statistics (Elementary and High School)
P5	Gonçalves and Strapasson (2007)	Information Processing: Statistics for Elementary Education [O Tratamento da Informação: Estatística para o Ensino Fundamental]	Probability and Statistics (Elementary School)
P6	Yun-Jeong and Sun-Yeong (2009)	Escaping from the Cat's Claws [Fugindo das garras do gato]	Statistics (Elementary School)
P7	Bueno (2015)	Statisticopolis (<i>Estaticópolis</i>): A new way to learn statistics [Estaticópolis: um jeito novo de aprender estatística]	Statistics (Elementary School)
P8	Braz (2020)	Getting to Know Statistics (statistics for kids – Book 1) [Conhecendo a Estatística (estatística para baixinhos – Livro 1)]	Statistics (starting at age 4)
P9	Barcarolo (2021)	A Journey in the Statistical Universe [Uma viagem no Universo Estatístico]	Statistics (Basic Education)
P10	Silva et al . (2022)	Statistical Picnic [Piquenique Estatístico]	Statistics (Elementary School)

Source: Prepared by the authors (2026).

The description of each editorial project (paradidactic educational books) was organized into a single text body (corpus), with each project defined by the IRaMuTeQ software as a 'text segment'. The corpus was structured using command lines that specify the identification numbers of each paradidactic book, followed by essential variables required for the textual analysis. In this research, the variables were coded as follows:

- (1) Paradidactic book presenting statistical concepts targeted at the early years of elementary school: Paradidactic_01, and so on up to Paradidactic_10;

- (2) Year of publication of the paradidactic book (coded as PubYear):
 PubYear_01, published in 1997; PubYear_02, published in 1998;
 PubYear_03, published in 2001; PubYear_04, published in 2002;
 PubYear_05, published in 2007; PubYear_06, published in 2009;
 PubYear_07, published in 2015; PubYear_08, published in 2020;
 PubYear_09, published in 2021; PubYear_10, published in 2022;
- (3) Brazilian state of publication of the paradidactic book (printed format) or identification of electronic format (coded as PublisherLoc):
 PublisherLoc_01, Rio de Janeiro; PublisherLoc_02, São Paulo;
 PublisherLoc_03, Londrina; PublisherLoc_04, E-book;
- (4) Schooling cycle targeted by the paradidactic book (coded as SchoolCycle):
 SchoolCycle_01, from the early years of elementary school onward;
 SchoolCycle_02, elementary school; SchoolCycle_03, early years of elementary school;
 SchoolCycle_04, K-12 education (Basic Education); SchoolCycle_05, from early childhood education onward;
- (5) Curricular policy document in effect during the publication period of the paradidactic book (coded as CurricDoc):
 CurricDoc_01, PCN; CurricDoc_02, BNCC;
- (6) Concepts addressed in the paradidactic book (coded as FocusArea):
 FocusArea_01, probability and statistics; FocusArea_02, statistics;
- (7) Authorship profile of the paradidactic book (coded as Authors):
 Authors_01, national; Authors_02, international; Authors_03, national and international.

In addition, the presentation texts of the paradidactic books comprising the textual corpus were formatted according to the IRaMuTeQ tutorial guidelines (Camargo; Justo, 2013), mainly concerning accentuation, special characters, and formatting. The procedure for organizing the command lines to insert the scientific outputs is illustrated in the fragment of the first text (translated from Portuguese to English):

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**** *Paradidactic_01 * PubYear_01 * PublisherLoc_01 * SchoolCycle_01 *  

CurricDoc_01 * FocusArea_01 * Authors_01  

Developed during the implementation of the National Curriculum Parameters  

(PCN) for the early years of elementary school, this supplementary  

educational book focuses on teaching statistics and probability. It is the  

outcome of a three-year effort by a team from the Projeto Fundação at the
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Federal University of Rio de Janeiro. Through playful activities and relatable childhood scenarios, it introduces fundamental concepts of Descriptive Statistics and Probability.

For the analysis, Reinert's method (1998) was used, which proposes the application of a Descending Hierarchical Classification (DHC). The objective of this technique is to obtain classes of Text Segments (TS) that display similar vocabulary to one another. Simultaneously, the method ensures that these classes possess a distinct vocabulary in relation to the segments of other categories.

The interpretation of the DHC results is sustained by the hypothesis that the use of similar lexical forms is linked to common representations or concepts (Reinert, 1987). For this reason, Reinert's method (Reinert, 1987) is frequently utilized to identify underlying themes within a set of texts.

It is emphasized that the choice to adopt one analysis technique over another depends on the characteristics of the problem and the research objectives (Leblanc, 2015). In this sense, the researcher's theoretical-methodological framework, combined with the support of lexicometric analysis software, can provide greater reliability to inferences drawn in qualitative research (Santos *et al.*, 2017).

Given this, the present study described and discussed the characteristics of using the IRaMuTeQ software for data analysis. The focus of the investigation was directed at the description of paradidactic books that present statistical concepts aimed at the early years of Elementary School.

Therefore, this analysis was based on lexical proximity and the idea that words used in a similar context are associated with the same lexical world and form part of specific mental worlds or representation systems. In this analysis, the text segments were classified according to their respective vocabulary, and the set of terms was partitioned according to the frequency of word roots. The system sought to obtain classes formed by words that were significantly associated with a given class (significance begins with the chi-square test - χ^2).

According to Oliveira (2015), this is one of the most important analyses in IRaMuTeQ because the software utilizes correlation logic, starting from segmentations of the textual corpus alongside the list of reduced forms and the Portuguese dictionary available within it, to present a hierarchical schema of classes. In this way, the text is processed so that vocabulary classes can be identified, making it possible to infer

which ideas the textual corpus intends to convey; that is, the analysis is conducted through a computer-processed statistical logic applied lexically.

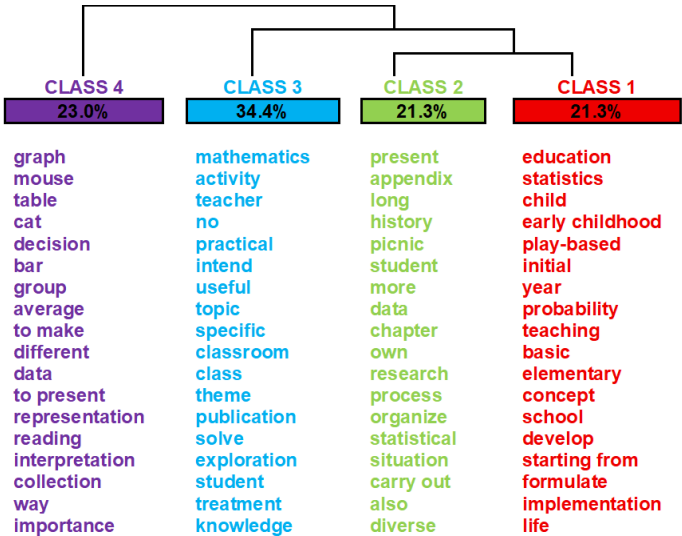
4 Analyzing paradidactic books regarding the teaching of Statistics

The initial analysis performed by IRaMuTeQ focuses on the statistical data of the corpus. The system details the total number of texts and segments, as well as the mean word frequency. Additionally, it displays the overall frequency of each lexical form along with its corresponding grammatical category.

Furthermore, it should be noted that Descending Hierarchical Analysis (DHA) requires a minimum retention rate of 75% of text segments to ensure effective classification of any textual material. Analyses yielding retention below this threshold are deemed inadequate, as they provide only partial classification (Camargo; Justo, 2013). In this regard, the textual corpus analyzed in the present study is considered both representative and valid, achieving a retention rate of 76.25%.

Consequently, in the DHA tab of the IRaMuTeQ output, it was possible to access the phylogram (Figure 1), which illustrates the partitions performed on the corpus until reaching the four final classes (translated from Portuguese to English). The phylogram is read from left to right.

Figure 1 – Reinert Method Classification Results: Phylogram



Source: IRAMUTEQ software output.

The phylogram presented in the text corresponds to the original output generated by the IRaMuTeQ software. It should be noted that the apparent

fragmentation or truncation of certain words in the image stems from the text analysis tool's automatic formatting pattern, which restricts the displayed character count. Furthermore, words showing a statistically significant association with the formation and differentiation of each resulting class are specifically highlighted.

Accordingly, in the results of the Reinert Method Classification: Phylogram (Figure 2), the corpus was split (first partition/iteration) into the subcorpus represented by Class 4, accounting for 23.0% of the textual corpus. Next, within the same branch of the phylogram, a second partition contains Class 3, representing 34.4% of the total. Finally, the third and final partition comprises Classes 2 and 1, each accounting for 21.3% of the overall corpus.

The four classes group the active forms and organized words with the highest frequencies, listed in descending order. These units were identified as significant representatives of each subcorpus using the chi-square association test (χ^2) generated by IRaMuTeQ. This process demonstrates the degree of association of terms both within their respective classes and across them, as shown in the phylogram.

Considering the phylogram presented in Figure 1, the four classes are named, individually or collectively, as follows:

1. Printed paradidactic materials based on every day and research situations to teach statistical concepts (Class 4, identified in purple in the Dendrogram): Everyday situations are used as a starting point to introduce statistical concepts, allowing early elementary school students to become familiar with notions such as data collection, frequency tables, and bar, pie, and line charts, among others.
2. Printed paradidactic materials from university research groups aimed at teaching statistical and probabilistic concepts through real-world situations to foster informed citizenship (Class 3, identified in blue in the Dendrogram): The proposed activities address the application of statistics in modern society and, with a touch of humor, offer elements to stimulate social reflection in future citizens, utilizing resources that enhance learning.
3. Digital paradidactic materials aimed at teaching statistical concepts through playful narratives (Class 2, identified in green in the Dendrogram): Through engaging and playful fiction, various narratives create a dialogue with the

reader, aiming to develop foundational statistical concepts such as data collection, organization, presentation, analysis, and interpretation.

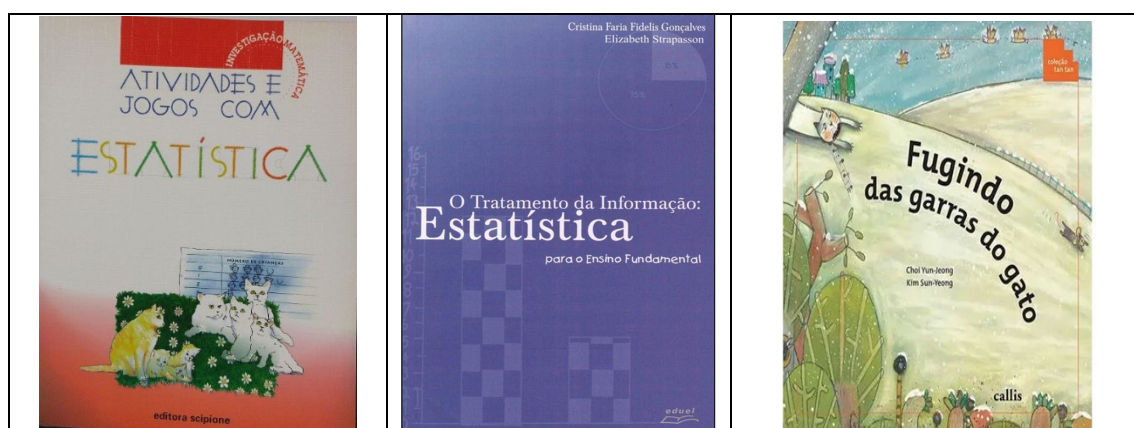
4. Digital paradidactic materials for teaching statistical concepts through the investigative cycle according to the BNCC (Class 1, identified in red in the Dendrogram): This category develops statistical concepts and skills from Early Childhood Education through Elementary School in accordance with the BNCC. Designed as an interactive and playful approach, it promotes statistical learning via the investigative cycle, providing children with a broader world perspective from the start of Basic Education.

Thus, the first subcorpus corresponds to Class 4 of the Phylogram, highlighted in purple in the Phylogram and named "Paradidactic books in printed format, starting from every day and research situations to teach statistical concepts". This class consists of paradidactic books 2, 5, and 6, authored by Smoothey (1998), Gonçalves and Strapasson (2007), and Yun-Jeong and Sun-Yeong (2009), respectively.

The paradidactic books in this grouping were written and published by Brazilian commercial publishers in the state of São Paulo. Specifically, paradidactic books 2 and 6 were written by international authors to support the teaching of Statistics, having been translated into Portuguese during the validity of the PCNs and aimed at Elementary Education, including the early years (students aged 6 to 10). Notably, they are still sold on websites and in bookstores selling new and used books.

Figure 2 displays the covers of the paradidactic books published in the Brazilian publishing market that make up this grouping.

Figure 2 – Cover presentation of the paradidactic books published in the Brazilian publishing market that comprise Class 4



Source: Prepared by the authors (2026).

The Mathematical Investigation (Investigação Matemática) series published by Editora Scipione includes a volume addressing statistical content based on Smoothery (1998). This paradidactic work focuses on data collection, frequency tables, sampling, pictograms, bar and pie charts, calculations of the mean, mode, and median, range, and line graphs. The theoretical grounding of the work is anchored in everyday contexts to introduce statistical concepts, aiming at the progressive familiarization of students with data literacy. Such an approach enables the transposition of theoretical knowledge into solving playful problems, structured as logical challenges, interactive pathways, and hands-on activities, such as origami.

In Yun-Jeong and Sun-Yeong (2009), a story is told about a group of mice that decides to teach a mean cat a lesson. The proposals formulated by the characters (the mice) are submitted to the collective and validated through voting processes and decision-making. The narrative allows for the immediate identification of the group's preferences at each stage; this visual transposition assists children in correlating concrete objects with their respective graphical representations, thereby establishing the cognitive support necessary for grasping fundamental concepts of statistics and probability.

Regarding the development of paradidactic materials, Gonçalves and Strapasson (2007) argue that exposing students to diverse statistical datasets, combined with encouraging rigorous analysis, fosters the development of critical thinking. This competency is essential for educating conscious citizens who are capable of interpreting the complexities of contemporary reality.

The paradidactic work in question proposes playful activities rooted in children's everyday lives to introduce elementary concepts of Statistics and Probability, in alignment with the curriculum for the early years of Elementary Education. According to the authors, the systematic exposure of students to various graphs and tables, coupled with the stimulation of analytical observation, promotes the development of critical thinking. This process is essential for cultivating conscious citizens capable of interpreting the complexities of daily reality (Gonçalves; Strapasson, 2007).

The works analyzed in this first grouping utilize paradidactic literature as a strategic tool for statistical literacy, integrating concepts such as data collection, measures of central tendency, and graphical representations into playful and narrative

contexts. While Smoothey's series (1998) focuses on translating theoretical content into hands-on activities and logic puzzles, the narrative by Yun-Jeong and Sun-Yeong (2009) relies on collective decision-making processes to instantiate mathematical abstractions. Complementarily, Gonçalves and Strapasson (2007) emphasize that systematic exposure to data and graphs from the early years of schooling is essential for developing critical thinking, empowering students to interpret social reality consciously and autonomously.

Continuing the analysis, the second subcorpus is observed, represented by Class 3 of the Phylogram and identified by the color blue. This class was named “Printed paradidactic materials from university research groups for teaching statistical and probabilistic concepts based on real-life situations to foster informed citizenship”. The group comprises paradidactic books 1, 3, and 4, authored by Lopes (1997), Imenes, Jakubo, and Lellis (2001), and Lopes (2002), respectively.

The paradidactic books in this cluster were written by Brazilian authors and published by Brazilian university presses, originating from research groups at Brazilian public universities. They were published during the period in which the PCNs were in effect and were targeted at elementary and middle school education. These works remain commercially available in new and used book markets, as well as in digital format (PDF). The covers of these paradidactic books published in the Brazilian editorial market are shown in the following figure.

Figure 3 – Cover presentation of the paradidactic books published in the Brazilian market that compose Class 3



Source: Prepared by the authors (2026).

As the editor of instructional materials for the Fundão Project at the Federal University of Rio de Janeiro (UFRJ), Lopes (1997, 2002) advocates a contextualized approach to teaching. Her proposal involves leveraging students' daily lives to ground the application of Statistics and Probability concepts. In this manner, learning encompasses all stages of the investigative process, from data collection and organization to final analysis.

In her 1997 work, Lopes presents suggested activities aimed at equipping teachers to address the Information Processing strand, as recommended by the PCNs. Subsequently, Lopes (2002) expands this scope by integrating these activities into various topics within the Basic Education curriculum, based on the principle that this level of schooling should enable students to use mathematical tools to understand and interpret their surrounding reality.

The relevance of information processing is emphasized in Lopes (2002) as an essential mechanism for analyzing quantitative data across multiple contexts of human activity. It is argued that mastering this language is fundamental to exercising citizenship, a precept that gained traction in the Brazilian educational landscape following the promulgation of the PCNs (Brasil, 1997), which incorporated this theme into the Mathematics curriculum.

According to Oliveira (2024), since 1982, prior to its current designation, the Mathematics Department of the Fundão Project at the Federal University of Rio de Janeiro (UFRJ) has been developing outreach initiatives focused on continuing teacher education. These initiatives are articulated with research in the field of Mathematics Education and enjoy international recognition. The maturation of this outreach dimension culminated in 1993 with the implementation of the Specialization Course in Mathematics Teaching and subsequently supported the structuring of the Mathematics Teaching Program (PEMAT) in 2006, both affiliated with the institution's Institute of Mathematics.

Regarding this body of work, the collection *What is Mathematics for? (Pra que Serve a Matemática)* (Editora Atual) aims to highlight the practical applicability of mathematical knowledge through its contextualization in everyday situations. The work adopts a visual language similar to comic books, structured around concise, thematic texts, as exemplified by the volume *Statistics* by Imenes, Jakubo, and Lellis (2001).

From this perspective, Imenes, Jakubo, and Lellis (2001) propose addressing statistical content through diverse textual genres, such as newspaper articles, editorial cartoons, and comic strips. The authors' goal was to demonstrate the relevance of Statistics in decision-making processes and everyday problem-solving. The paradidactic work in question explores social and economic themes such as school dropout rates, child labor, pharmacological efficacy, traffic accidents, and inflation indices.

The proposed approach by authors such as Lopes (1997, 2002) and Imenes, Jakubo, and Lellis (2001) is grounded in the use of Statistics, as well as Probability, as tools for interpreting reality and exercising citizenship. The primary axes are considered to be:

- Contextualization and Everyday Context: The exploration of students' real-life situations across data collection, organization, and analysis stages, aligning with the guidelines of the "Information Handling" strand in the PCNs;
- Interdisciplinarity: The integration of Statistics across various topics within the Basic Education curriculum, extending beyond isolated calculations to the interpretation of human, social, and economic contexts;
- Language and Textual Genres: The use of materials featuring accessible visual language (similar to comic books) alongside diverse textual genres, such as editorial cartoons, news reports, and tables;
- Critical Social Themes: The practical application of mathematical knowledge to issues of social relevance, including child labor and school dropout rates, drug efficacy, inflation indices, and traffic accidents.

Thus, it is understood that these materials aim to equip students for conscious decision-making. Through this process, Statistics ceases to be a mere set of calculations and becomes an essential language, enabling students to comprehend and actively intervene in society.

In the third and final subcorpus, Class 2 (highlighted in green) stands out, titled "Paradidactic materials in digital formats aimed at teaching statistical concepts through playful narratives". This category comprises Works 7 and 10, authored by Bueno

(2015) and Silva *et al.* (2022), respectively. Notably, both resources were originally published in digital formats, specifically as e-books on the Amazon Kindle platform.

The covers of these paradidactic books published in Brazil are illustrated in Figure 4, showcasing the visual presentation of these works within the publishing market.

Figure 4 – Homepage (cover) presentation of paradidactic books published in the Brazilian editorial market that compose Class 2



Source: Prepared by the authors (2026).

According to Bueno (2015), the work proposes a narrative structure that departs from conventional biographical and didactic models. By foregoing chronological linearity and strict technical density, characterized by an excess of formulas and theoretical abstractions, the author adopts fictional literature as a pedagogical strategy. In *Estaticópolis*, a dialogic interaction between the narrator and the reader drives the plot, which is set in a context where statistical principles structure social and communicative dynamics.

Throughout the narrative, statistical applications are introduced organically by establishing analogies with phenomena present in students' daily lives. This approach encompasses scenarios ranging from news consumption and electoral polling to the analysis of advertising campaigns and consumer relations, thereby enabling a critical reading of the nuances underlying these processes. Consequently, Statistics transcends a purely theoretical dimension to consolidate itself as contextualized knowledge, functioning as an essential instrument for promoting active citizenship (Bueno, 2015).

In their paradidactic book, Silva *et al.* (2022) present a narrative set against the backdrop of a picnic to introduce fundamental statistical concepts. The work

proposes a playful approach to developing skills in data collection, organization, analysis, and interpretation. The narrative arc begins in a school environment, where the proposal of an extracurricular event serves as a pedagogical catalyst.

Prompted by this task, the teacher character conducts a survey on food preferences, fostering the systematization and discussion of the gathered data. Throughout this exploratory process, the students, as characters within the proposed narrative, assume an active role, culminating in pedagogical transposition during the picnic. They demonstrate autonomy by applying statistical knowledge to everyday situations, extending beyond formally mediated content (Silva *et al.*, 2022).

The works of Bueno (2015) and Silva *et al.* (2022) both employ fictional and playful narratives as pedagogical strategies to humanize the teaching of Statistics, shifting away from traditional technical rigor in favor of practical contextualization. While Bueno (2015) explores the dystopia of *Estaticópolis* to foster critical thinking and citizenship through the analysis of social and media phenomena, Silva *et al.* (2022) draw upon an everyday school picnic setting to encourage student autonomy in data collection and interpretation. In both instances, pedagogical transposition occurs by converting abstract concepts into organic tools, transforming students into active agents capable of applying statistical knowledge to interpret and organize their surrounding reality.

Finally, within the third subcorpus, Class 1 of the Dendrogram (red), designated as “Electronic paradidactic materials for teaching statistical concepts through the investigative cycle according to the BNCC”, comprises paradidactic books 8 and 9 by Braz (2020) and Barcarolo (2021), respectively. Notably, both paradidactic books were published electronically as Amazon Kindle e-books by Brazilian authors, addressing statistical content outlined by the BNCC.

Figure 5 shows the opening page and cover of the paradidactic books published in the Brazilian editorial market. This visualization allows for an analysis of the primary graphic and structural elements adopted by national publishers. Based on these examples, it becomes possible to gain a clearer understanding of the visual presentation strategies aimed at a school-age audience.

Figure 5 – Presentation of homepage (cover) of paradidactic books published in the Brazilian market that compose Class 1



Source: Prepared by the authors (2026).

From the perspective of Braz (2020), statistical literacy is introduced early, at four years of age, utilizing playfulness as a mediator of complex concepts. The work aligns with the competencies of the BNCC by structuring the learning process around the investigative cycle. This approach not only fosters data reading but also employs everyday analogies, personified in the figures of the "graph friend" and the "table friend", to convert mathematical abstractions into tools for interpreting the child's social and practical reality.

Still within this perspective, the work of Barcarolo (2021) is presented as a pedagogical narrative structured around the allegory of a space journey through the "Statistical Universe" (*Uma viagem no Universo Estatístico*). The reader's progression occurs linearly and cumulatively, traveling through the planets Information, Data, Descriptive, Graphical-Tabular, Probabilistic, and Inferential, culminating in Planet Statistical. This structure not only organizes fundamental concepts but also aligns teaching strategies with the competencies set forth by the BNCC for Basic Education. The author uses contextualization as a guiding thread, proposing statistical literacy through an interdisciplinary approach that breaks away from the traditional view of Statistics as a mere subfield of Mathematics.

Presenting a synthesis that unifies the approaches of both authors, modern statistical literacy is proposed as a process that begins in early childhood and expands through structuring narratives. According to Braz (2020), this introduction occurs early, at age four, utilizing playfulness and the investigative cycle to transform mathematical

abstractions into practical tools. Through analogies such as “graph friend” and the “table friend”, the child begins to interpret their social reality. Expanding upon this initial foundation, the work of Barcarolo (2021) organizes knowledge into a space journey through the “Statistical Universe” (Uma viagem no Universo Estatístico). In this linear progression, the student moves through distinct stages of complexity: i) Initial Planets: Focus on information collection and data organization; ii) Development: Exploration of the Descriptive and Graphical-Tabular levels.

The lexical distribution of the chi-square test and the mapping on the phylogram reveal rigorous epistemological consistency within the analyzed corpus. This finding demonstrates that the operational and market heterogeneity of the sector does not hinder a convergent movement in the teaching of Statistics in Brazil. Thus, a clear ongoing conceptual and methodological reconfiguration is identified in the field.

This transformation shifts paradidactic literature away from instrumental calculation, previously focused on manual tasks and everyday challenges (Class 4), toward emancipatory literacy. The transition occurs through engagement in citizenship education (Class 3), moves through the playfulness of fictional narrative (Class 2), and consolidates in the BNCC-aligned investigative cycle (Class 1). This represents a continuous trajectory of pedagogical renewal.

By transcending the mere application of algorithms and graphs, this didactic transposition reframes data culture from early childhood to the final years of Basic Education. Consequently, statistical literacy ceases to be a mere topic in the curricular Mathematics syllabus. It establishes itself as an indispensable political and critical language for reading and consciously intervening in the social fabric.

5 Concluding Remarks

Regarding the objectives of this research, we mapped Brazilian editorial projects, specifically paradidactic books aimed at teaching Statistics in the early grades of Elementary School. Furthermore, we investigated the potential of these works as didactic resources to support teaching and learning processes.

The set of analyzed works converges on the use of paradidactic literature and playful narratives as fundamental strategies for statistical literacy from childhood, transforming abstract concepts into tools for social reading and the exercise of

citizenship. Through thematic axes such as everyday contextualization, interdisciplinarity, and the use of accessible visual languages, the authors propose a didactic transposition that replaces isolated technical rigor with practical application to critical social issues and decision-making processes. Thus, Statistics education is structured as a progressive investigative cycle, extending from the manipulation of elementary data to the interpretation of complex scenarios, aiming to foster autonomous students capable of interpreting and consciously intervening in their surrounding reality.

Therefore, the Brazilian editorial production of paradidactic books focused on Statistics education in the early grades of Elementary School aligns with the premises of Oliveira Júnior and Ciabotti (2018). These works are predominantly structured under the genre of fictional narrative, mobilizing cognitive resources that enhance student engagement. This approach enables the introduction of statistical concepts through a playful and imaginative interface, providing the content with an appealing and contextualized pedagogical character.

Furthermore, we observe adherence to the statistical literacy model proposed by Gal (2002), which posits the articulated mobilization of cognitive and affective components. Regarding the cognitive dimension, the works converge on the premise that interpreting statistical information transcends isolated technical mastery, requiring a foundation of interdisciplinary knowledge. This perspective is grounded in an approach that aims to overcome the fragmentation of traditional knowledge, promoting the integration of different fields toward a holistic and complex understanding of reality.

Regarding the affective component, Gal (2002) posits that processing statistical information transcends the cognitive dimension, relying on the ability to formulate questions and exercise a critical stance. Such a disposition is intrinsically influenced by the individual's belief system and attitudes toward this field of knowledge.

The following aspects are also observed: 1) Statistical contents relevant to the early grades of Elementary School are addressed using an accessible, humorous language appealing to 6- to 10-year-old students; 2) The narrative is age-appropriate for this target demographic; 3) The contextualization aligns with the students' reality, based on Skovsmose's (2014) concept of an inquiry landscape referenced to real-life situations; 4) Statistical concepts are introduced fluidly as the narrative unfolds; and 5)

The proposed activities demonstrate potential to activate statistical literacy competencies.

It was observed that the books aimed to engage with playful aspects (*lúdico*), ensuring children do not perceive alternative meanings within them. Furthermore, they allow teachers to emphasize, for instance, the moral values embedded in the stories, while requiring the creation of instructional strategies that prevent activities from becoming dull for students, thereby avoiding aversion to such tasks and preventing student disengagement from literary works.

Specifically, paradidactic books 1 through 6 are commercialized in print format and align with the PCNs (Brazil, 1997, 1998). In contrast, paradidactic books 7 through 10 were commercialized in electronic format (Kindle e-book), considering the statistical content from the "Information Processing" module of the PCNs (Brazil, 1997, 1998) as well as the learning objects and statistical skills outlined in the BNCC (Brazil, 2018) for early elementary education (ages 6 to 10).

Paradidactic books 1 through 7 align with the perspective of Ciabotti and Oliveira Júnior (2019). According to the authors, following the establishment of the PCNs for Elementary Education and the Guidelines and Bases Law (LDB), such works became omnipresent in daily school routines. Unlike traditional textbooks, these materials stand out for incorporating cross-cutting themes into the curriculum.

As noted by Ciabotti and Oliveira Júnior (2019), these books function as educational resources capable of significantly enriching lesson plans. They act as learning-enhancing materials by providing teachers with tools to teach statistical concepts. Consequently, they foster reflective and critical interaction between students and their social environment, which is essential for the full exercise of citizenship.

Furthermore, according to the PCNs, paradidactic books serve to provide teachers with opportunities to develop work focused on values such as kindness, friendship, respect, honesty, ecology, the environment, and pollution control, among others (Brazil, 1997, 1998). Regarding the BNCC (Brazil, 2018), paradidactic books and their importance are explicitly cited, highlighting that over the school years, the selection of authoritative sources, such as paradidactic books, among other instructional materials, should be broadened.

It is worth noting that while digital publications offer logistical advantages and cost reductions for researchers, their implementation must account for technological disparities across Brazilian schools. Printed paradidactic resources continue to play a crucial role in reading mediation due to their ease of handling in the classroom. Ultimately, democratizing access, whether digital or physical, is decisive, given that the breadth of the library collection is the primary driver in fostering this practice, which is fundamental to human development.

The results reinforce the relevance of investigating the narrative properties of paradidactic books. As Laguna (2012) posits, the efficacy of this genre lies in its ability to transpose statistical information and facts into a fictional plot, allowing technical knowledge to be assimilated in a contextualized and dialogic manner.

Finally, grounded in the analysis of paradidactic materials aimed at teaching Statistics in early elementary education and commercialized within the Brazilian publishing market, it is conceived that, according to Munakata (1997), they are instructional objects not intended to restrict or coerce their mode of use through their layout. Indeed, the market presents the paradidactic book under the guise of being a complementary and independent resource.

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