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EXPLORING THE PRESENCE OF MATHEMATICS IN THE SPANISH WEEKLY MAGAZINE "ALREDEDOR DEL MUNDO" (1899–1930)

Summary: The presence of recreational problems in mathematics texts is as old as the discipline itself. Recreational mathematics can be useful in education in several ways. This idea was exploited beyond the formal educational contexts already during the 18th c. in Spain, where it was sometimes possible to find mathematical problems in daily journals that fostered interactions between readers. This was not a local phenomenon, since we know of the presence of recreational mathematics columns in American newspapers from the end of the 19th c. In this paper, we present a first exploratory approach to the analysis of the presence of mathematics in the Spanish weekly magazine *Alrededor del Mundo* [Around the World], which was published between 1899 and 1930. In this magazine, we find works of scientific dissemination, questions and answers sections, travel articles, letters to the editor, etc. The last pages were always dedicated to a fixed section called *Recetas y Recreos* [Recipes and Recreations], which contained medicinal and gastronomic recipes, chess problems, and also riddles and enigmas that sometimes were of mathematical content. This research aims to analyze the presence of mathematics not only in this recreational section, but also in the entire magazine. Our work illustrates the interest of studying the presence of mathematics in non-formal contexts and environments, and it places this Spanish particular case in what seems to have been a wider international trend.

Keywords: mathematics, recreational mathematics, press, Spain, early 20th century

Introduction

Karp points out that, in the context of the history of mathematics education, we can consider almost anything as a primary source 'since the subject of our research is the history of mathematics education in its relation to other spheres of human activity'[1]. Mathematics and mathematics education are social and cultural activities. Accordingly, communication, dissemination, and popularization of ideas play an essential role in both fields and deserve to be carefully researched from a historical point of view.

The existence of periodical publications, i.e., printed documents that appeared with a relatively regular periodicity, seems to be almost as old as the printing press[2]. However, it was not until the 17th c. that modern recognizable categories such as newspapers[3], or scientific journals[4] appeared. Later, during the 19th c., 'readers claimed the right to intervene in scientific debates and favored publications that appeared to accommodate their demands'[5]. This was particularly clear, not only in the context of scientific publications, but also with respect to educational or pedagogical journals addressed to teachers, which were established during the 19th c. and played a very important role in spreading mathematical culture[6] and in the establishment of teachers as a professional group[7].

Fig. 1 illustrates the existence of different types of periodical publications, categorized according to their nature and target population. Some journals are easily classified, but these categories often overlap. For example, journals for teachers may include scientific research papers on education alongside practice-based teaching proposals on certain topics. Similarly, an entertainment journal might include sections advising parents on educating their children or suggesting educational problems or experiments for students. The situation with readers is

[1] A. Karp, *Survey of the State of the Art*, [in:] *History of Mathematics Teaching and Learning. Achievements, Problems, Prospects*, ed. by A. Karp, F. Furinghetti, Springer, Cham 2016, p. 5.

[2] J. Weber, *Strassburg, 1605: The Origins of the Newspaper in Europe*, "German History" 2006, vol. 24, no. 3, p. 388.

[3] Ibidem, p. 396.

[4] A. Fyfe, J. McDougall-Waters, N. Moxham, *350 years of scientific periodicals*, "Notes and Records: The Royal Society Journal of the History of Science" 2015, vol. 69, no. 3, p. 229.

[5] P. Corsi, *What do you Mean by a Periodical? Forms and Functions*, "Notes and Records: The Royal Society Journal of the History of Science" 2016, vol. 70, no. 4, p. 325.

[6] F. Furinghetti, *The mathematical journals for teachers and the shaping of mathematics teachers' professional identity in post unity Italy*, [in:] *"Dig where you stand" 4. Proceedings of the fourth international conference on the history of mathematics education*, ed. by K. Bjarnadóttir, F. Furinghetti, M. Menghini, J. Prytz, G. Schubring, Edizioni Nuova Cultura, Turin 2017, p. 101.

[7] J. Krüger, *Mathematische Liefhebberye (1754–1769) and Wiskundig Tijdschrift (1904–1921): Both journals for Dutch teachers of mathematics*, [in:] *"Dig where you stand" 4. Proceedings of the fourth international conference on the history of mathematics education*, ed. by K. Bjarnadóttir, F. Furinghetti, M. Menghini, J. Prytz, G. Schubring, Edizioni Nuova Cultura, Turin 2017, p. 177.

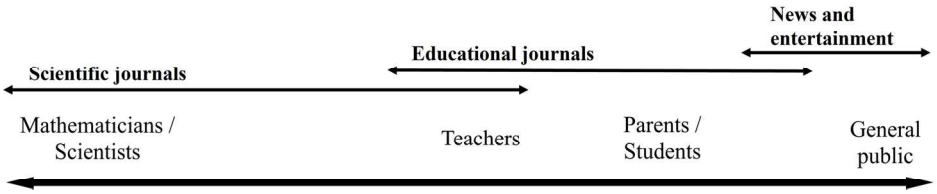

Fig. 1. Typology of periodical publications that potentially contain mathematics.
Note: Made by the author.

also complicated due to both the overlapping categories and the evolving definitions of 'scientist' and 'teacher' throughout history[8]. Regardless, Fig. 1 shows that as specialization increases from right to left, the presence, importance, and role of mathematics vary the publication's nature and intended audience.

There is already significant research on the presence of mathematics and mathematics education in these types of periodical publications. However, the focus has not been equal across the different types of publications. The greatest attention has been generally directed towards scientific and mathematical journals. We find case studies such as the work of Mariano Hormigón about "El Progreso Matemático"[9] or that of Peter Schreiber about "Archiv der Mathematik und Physik"[10], as well as more overarching works, like that of Jean Peiffer et al. studying the circulation of ideas and the interplay of mathematical journals between 1850 and 1950[11].

Educational journals aimed at teachers and students have also received attention. While scientific journals date back to the 17th c.[12], educational journals for different levels (primary, technical, or secondary education) are a more recent development, emerging around the same time in several countries[13]. The presence of mathematics in these journals differs, as they typically do not include research

[8] H.J. Smid, *History of Mathematics Teacher Education*, [in:] *Handbook on the History of Mathematics Education*, ed. by A. Karp, G. Schubring, Springer, Cham 2014, p. 579–595.

[9] M. Hormigón, *El Progreso Matemático (1891–1900): Un estudio sobre la primera revista matemática española*, "Llull: Revista de la Sociedad Española de Historia de las Ciencias y de las Técnicas" 1981, vol. 4, no. 6, p. 87–116.

[10] P. Schreiber, *Johan August Grunert and his Archiv der Mathematik und Physik as an integrative factor of mathematics*, [in:] *L'Europe mathématique: histoires, mythes, identités*, coord. by C. Goldstein, J. Gray, J. Ritter, Editions de la Maison des Sciences de l'Homme, Lyon 1996, p. 433–446.

[11] J. Peiffer, H. Gispert, P. Nabonnand, *Interplay between mathematical journals on various scales 1850–1950*, "Historia Mathematica" 2018, vol.45, no. 4, p. 323–333.

[12] P. Sergescu, *Les Mathématiques dans le Journal des Savants: Première période 1666–1701*, "Osiris" 1936, vol. 1, p. 568.

[13] C. Pizzarelli, *Teaching of mathematics in educational journals of Turin (1849–1894)*, [in:] *"Dig where you stand" 4. Proceedings of the fourth international conference on the history of mathematics education*, ed. by K. Bjarnadóttir, F. Furinghetti, M. Menghini, J. Prytz, G. Schubring, Edizioni Nuova Cultura, Turin 2017, p. 293–308.

papers or highly novel material[14]. In fact, Furinghetti and Smaglia suggest that the absence of academic mathematicians among the authors and readers of these journals may have offered a perspective closer to the reality of schools[15]. Consequently, studies have examined general descriptions[16], the treatment of school subjects[17], or the mathematical problem sections[18]. Recently, some journals specifically for students have also received attention[19].

Finally, perhaps due to lower expectations, the presence of mathematics in news and entertainment publications for the general public has been less explored in the literature. In this regard, research in Spain focusing on 18th c. daily journals[20] or on some local variety magazines[21] indicates that the presence of mathematics in these publications may be more significant than previously thought. In the United States, research on recreational mathematics in some 19th c. magazines for educated laypeople demonstrates how these sources reveal prevailing social views of mathematics[22].

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[14] S. Zelbo, *Building an American Mathematical Community from the Ground Up: Artemas Martin and the Mathematical Visitor*, [in:] *Advances in The History of Mathematics Education. International Studies in the History of Mathematics and its Teaching*, ed. by A. Karp, Springer, Cham 2022, p. 217–238

[15] F. Furinghetti, A. Somaglia, *The role of a journal on teaching mathematics and sciences issued at the beginning of the 20th century in professionalizing Italian primary school teachers*, [in:] *Researching the History of Mathematics Education*, ed. by F. Furinghetti, A. Karp, Springer, Cham 2018, p. 99.

[16] J. Gichelaar, *Half a century of Pythagoras, a mathematical magazine for students and teachers*, [in:] "*Dig where you stand" 4*, ed. by K. Bjarnadóttir, F. Furinghetti, M. Menghini, J. Prytz, G. Schubring, Edizioni Nuova Cultura, Turin 2017, p. 133–148.

[17] A.M. Oller-Marcén, *Arithmetic in Joan Benejam's La Enseñanza Racional (1888)*, [in:] "*Dig where you stand" 4*, ed. by K. Bjarnadóttir, F. Furinghetti, M. Menghini, J. Prytz, G. Schubring, Edizioni Nuova Cultura, Turin 2017, p. 283–299.

[18] J.M. Muñoz-Escolano, A.M. Oller-Marcén, M. Santágueda-Villanueva, *La sección de problemas matemáticos del boletín La Escuela (1913–1916)*, "Historia y Memoria de la Educación" 2022, vol. 16, p. 425–458.

[19] D. De Bock, W. Goemans, *Wiskunde Post, a mathematical magazine for students supporting the modern mathematics movement in Flanders*, Paper presented at the 11th Quadrennial Meeting of the International Study Group on the Relations between History and Pedagogy of Mathematics (HPM2024).

[20] M.J. Madrid, C. León-Mantero, J.C. Casas-Rosal, A.Maz-Machado, *Mathematics in the Spanish press: a case study of the 18th century journal Semanario de Salamanca*, "Humanities and Social Sciences Communications" 2023, vol. 10, p. 8; A.M. Oller-Marcén, *Mathematics in 18th Century Spanish Daily Press. The Early Years of Diario de Barcelona*, "Bolema: Boletim de Educação Matemática" 2023, vol. 37, no. 77, p. 1331.

[21] V. Meavilla-Seguí, A.M. Oller-Marcén, *Las Matemáticas en el Periódico «Miscelánea Turolense» (1891–1901)*, "Xiloca: Revista del Centro de Estudios del Jiloca" 2018, vol. 46, p. 53–64.

[22] S. Zelbo, *The recreational mathematics activities of ordinary nineteenth century Americans: A case study of two mathematics puzzle columns and their contributors*, "British Journal for the History of Mathematics" 2019, vol. 34, no. 3, p. 155.

Thus, this paper explores the following research question: What was the presence and the role of mathematics in the Spanish entertaining press that was published between the 19th and 20th c.? To address this, we examine the popular graphic magazine, "Alrededor del Mundo" [Around the World]. We aim to identify, describe, and characterize all instances of mathematics in this magazine. This implies that, unlike previous research, this study examines mathematical ideas throughout the entire text, not just recreational mathematics in puzzle columns.

The weekly magazine "Alrededor del Mundo"

The transition from the 19th to the 20th c. in Spain saw increasing professionalization of journalism, supported by the freedom of the press established (in principle) by the 1876 Spanish constitution. Newspaper publishing companies played a key role. Periodicals became commercial ventures, leading to a shift from information to entertainment that resulted in the appearance of numerous periodical magazines with diverse content. These magazines generally avoided explicit political stances, focusing instead on attracting and retaining readers. In this context of commercial competition, an important phenomenon took place: the emergence of the first graphic magazines[23] (Fig. 2).

The magazine "Alrededor del Mundo" was founded by Manuel Alhama Montes (Fig. 3). Born in San Sebastián in 1857, Alhama had already written for similar publications like "Heraldo de Madrid" or "El Imparcial" by the time he founded this magazine at age 42.

He also served as a war correspondent during the First Melillan campaign (1893–1894) and during the Philippine Revolution (1896–1898). Well educated, he married the daughter of the 7th Marquis of Vessolla. This marriage likely ensured his financial security. He wrote most of his articles under the pseudonym *Wanderer* and appears to have been quite a character. The following quotation comes from an obituary published in 1910 in "El Guadalete":

> Alhama Montes was of medium height and stout; his round face, tanned by the weather of many climates, was adorned with a neat, white and curly beard; in the look of his brown eyes, skilled in the art of undressing souls and guessing intentions, an expression of irony triumphed. Educated in England and France, he retained, despite his Latin temperament, that elegant, cold and correct equanimity that characterizes the northern races. He walked with short, very erect steps, with the obstinate stiffness of one who does not want to grow old. He dressed in London and had a predilection for light-colored suits […] his rooms were filled with Tunisian tapestries, blurry paintings, Pompeian figurines, strange weapons[24].

[23] M.C. Seoane, M.D. Saiz, *Historia del Periodismo en España*, vol. 3, Alianza Editorial, Madrid 1998, p. 171–176.

[24] E. Zamacois, *Manuel Alhama Montes*, "El Guadalete. Peródico político y literario" 1910, year LVI, no. 17355, p. 1.

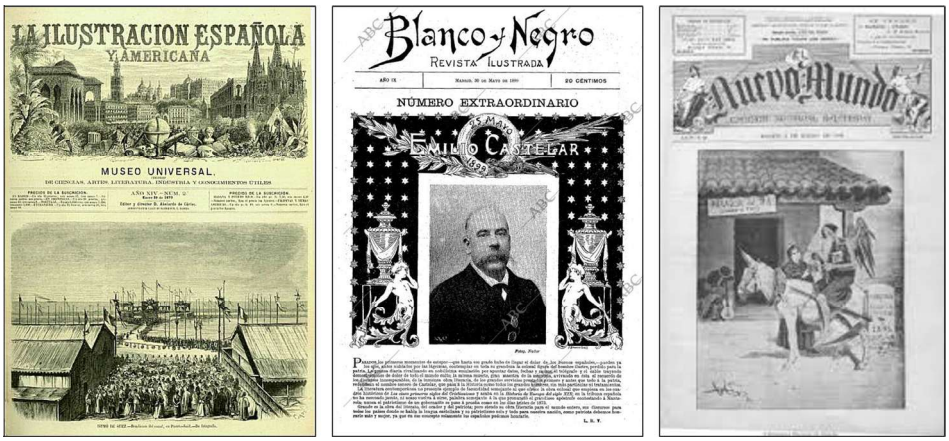

Fig. 2. Some of the most popular Spanish graphic magazines at the end of the 19th c.
Notes: Made by the autor. Images courtesy of the Spanish National Library.

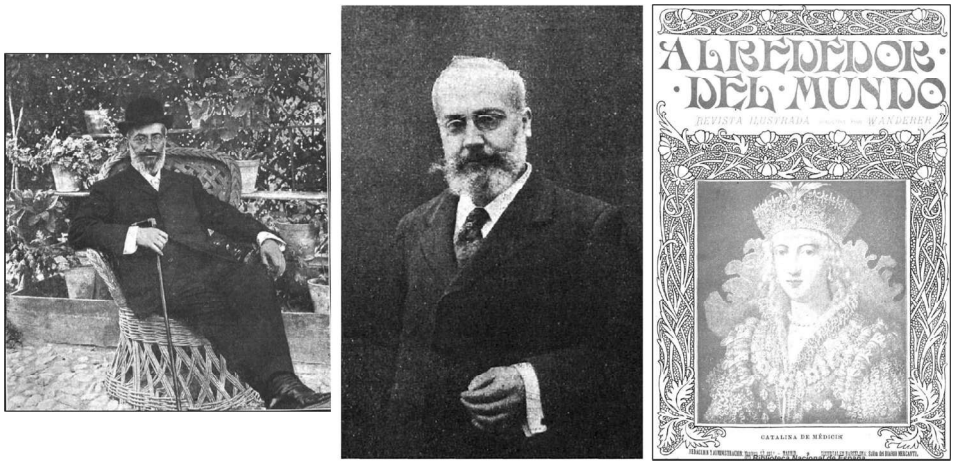

Fig. 3. Two pictures of Manuel Alhama Montes, and the cover page of the first issue.
Notes: Made by the autor. Images courtesy of the Spanish National Library.

"Alrededor del Mundo" was a weekly publication of about 20–25 pages per issue, described at the time as a publication covering customs, travel, sciences, inventions, arts, and curiosities. The magazine lacked clear sections. The first issue outlined its upcoming contents: remembrances of my life, recollections of a festive writer, opinions about art, aristocratic gatherings in Madrid, illustrated journeys in Spain, illustrated journeys abroad, scientific discoveries, and animal customs and mysteries.

This list appeared at the beginning of each issue; however, its content varied over time with additions and removals. It is worth noting that one of the very few

long-running regular sections of the journal, called Recipes and Recreations, was never mentioned in these summaries. This recreational section contained medicinal and gastronomic recipes, chess problems, and riddles and enigmas.

The following quotation from 1904 does not convey a very positive view of the magazine: 'It is arid and pedantic […] It is the weekly of the naïve, of the simple. I remember a good-natured grocer who, while digesting his dinner, would spell out the wonders of *Alrededor del Mundo* to his wife and children, who listened open-mouthed'[25]. However, we must be careful not to take these words for granted, since they come from a competitor. In fact, there is evidence that "Alrededor del Mundo" was not as simple or naïve as the previous words suggest. For example, this journal was a pioneer in the regular inclusion of chess problems[26]. It also included the first publication in Europe about Vucetich's fingerprint identification system[27]. Finally, "Alrededor del Mundo" contains the first paper published in Spain about Montessori's method that included pictures[28].

In any case, the magazine spanned over 1627 issues, for a total of 42371 pages. This is evidence of its success and shows that the topics covered by the magazine (whether simple and naïve or specialized and erudite) were interesting enough for readers to secure a long existence for the publication.

Some theoretical and methodological aspects

We carry out an exploratory and descriptive single-case study[29]. Yin provides a rationale for single-case research designs. One of them is related to the selection of a representative or typical case that has the potential to provide valuable information about a more general phenomenon. This author also points out that single-case studies are of particular interest when they serve longitudinal purposes[30]. Furthermore, a case study usually involves a spatially and temporally delimited phenomenon of some theoretical significance[31]. Consequently, we find multiple examples of case study research within the field of history of mathematics educa-

[25] J. Francés, *Alrededor del Mundo*, "Alma Española" 1904, year II, no. 20, p. 15.

[26] J. Brasó Rius, *Inicios del Ajedrez en la Prensa y en las Publicaciones Deportivas en España (1861–1915)*, "Recorde: Revista de História do Deporte" 2014, vol. 7, no. 1, p. 13.

[27] F. de Antón y Barberá, *Contribución española al auge en el uso de la dactiloscopia*, "Gaceta Internacional de Ciencias Forenses" 2018, no. 17, p. 19–20.

[28] F. Comas Rubí, B. Sureda García, *The photography and propaganda of the Maria Montessori method in Spain (1911–1931)*, "Paedagogica Historica: International Journal of the History of Education" 2012, vol. 48, no. 3, p. 577.

[29] J.W. Creswell, *Research design: qualitative, quantitative, and mixed methods approaches*, SAGE, London 2014, p. 14.

[30] R.K. Yin, *Case study research: Design and methods*, SAGE, Thousand Oaks 1984, p. 45–46.

[31] J. Gerring, *Case Study Research. Principles and Practices*, Cambridge University Press, Cambridge 2017, p. 27.

tion, and particularly in the context of research about periodical publications[32].

As we argued in the previous section, the magazine "Alrededor del Mundo" is a representative example of the graphic magazines that were rather common in Spain since the final years of the 19th c., in the context of an increasing level of alphabetization in the country[33]. This magazine was popular and accessible throughout the country. It can provide a realistic view of the kind of mathematical ideas that were present in this type of publication, and that were potentially available for their readers. On the other hand, this journal was published for quite a long time, between 1899 and 1930. Consequently, with more than 1600 issues, it has the potential for interesting longitudinal research that might unravel changes in the approach to mathematics, as well as in the weight of this discipline within the contents of the magazine.

Now, considering our exploratory approach, in this paper we focus only on the issues that appeared during the first year of the magazine's existence. Thus, we have analyzed a total of 30 issues published between 9 June and 28 December 1899. As Yin points out, we think that this single case study may serve as the first of a multiple-case study[34] in a way that our findings might guide further research on the topic.

All the issues of this magazine are digitized and available on the website of the Spanish National Library[35]. This meets the criteria of authenticity and credibility considered by Scott[36]. Regarding the criterion of representativeness, we think that it is guaranteed by the long life and popularity of the journal. Finally, when it comes to meaning, we will only be concerned about the literal content of the analyzed fragments. Our only interpretations will be related to determining whether certain fragments can be considered to contain mathematical ideas.

We have followed the basic principles of qualitative content analysis as described by Mayring[37] and, in particular, we carry out a text-driven analysis[38]. Our text material consists of the 30 issues published in 1899. Our units of analysis are all the different individual pieces of text that were published in each of those issues. Hence, our units can be of a very different nature according to the so-called

[32] S. Zelbo, *The recreational mathematics activities of ordinary nineteenth century Americans: A case study of two mathematics puzzle columns and their contributors*; A.M. Oller-Marcén, *Mathematics in 18th Century Spanish Daily Press. The Early Years of Diario de Barcelona.*

[33] M.C. Seoane, M.D. Saiz, *Historia del Periodismo en España*, p. 23.

[34] R.K. Yin, *Case study research: Design and methods*, p. 42.

[35] https://hemerotecadigital.bne.es/hd/es/card?sid=1769771 [accessed 4.12.2025].

[36] J. Scott, *A Matter of Record, Documentary Sources in Social Research*, Polity Press, Cambridge, MA 1990 p. 19–35.

[37] P. Mayring, *Qualitative Content Analysis. A Step-by-Step Guide*, SAGE, London 2022, p. 60–71.

[38] K. Krippendorff, *Content Analysis. An Introduction to Its Methodology*, SAGE, London 2014, p. 341.

journalistic genres[39]. They are usually classified according to their function into information and opinion, although they can have different orientations: they can be informative, narrative, argumentative, expository, or critical, and they can appear with or without a signature. In addition, we can also find the so-called annex genres[40]. These are texts elaborated to be inserted in a newspaper, but without fulfilling the aforementioned functions. They usually aim to educate, entertain or encourage participation, and some examples are journalistic literature, journalistic advertising, pastimes, letters to the editor, etc.

Table 1. Journalistic genres and their functions.

Genre	Information	Stories and chronicles	Opinion	Annex
Function	Just inform	Inform and provide interpretation	Give an opinion	Entertain, educate, and encourage participation

Source: S. Parrat, *Géneros Periodísticos en Prensa*, Quipus, Quito 2008, p. 110; R. Yanes Mesa, *Géneros periodísticos y géneros anexos*, Fragua, Madrid 2004.

We will pay special attention to the pastimes section of the magazine. It is difficult to come up with a comprehensive and satisfactory classification of recreational mathematics problems. Schaaf[41], for instance, provides a very long list of such problems organized into different categories. Some of them are characterized by the mathematical content (arithmetic, algebra, geometry, number theory, combinatorics, probability, topology, etc.). He also mentions categories such as classical problems of antiquity, manipulative recreations, magic squares, and many more. Obviously, these categories are by no means exhaustive or disjoint, but they might be useful to organize and describe our findings.

Presence of mathematics. A brief overview

First, we have identified mathematical content in 28 out of the 30 issues published during the year 1899. This means that more than 90% of the issues of that year included some type of mathematical content. This is a remarkable proportion, taking into account that this was an entertainment journal addressed to the general public.

[39] R.O. Wyatt, D.P. Badger, *A New Typology for Journalism and Mass Communication Writing*, "Journalism Educator" 1993, vol. 48, no. 1, p. 3–11.

[40] R. Yanes Mesa, *Géneros periodísticos y géneros anexos*, Fragua, Madrid 2004.

[41] W.L. Schaaf, *A Bibliography of Recreational Mathematics*, vol. 4, NCTM, Washington DC 1978.

Table 2. Monthly distribution of the different types of fragments containing mathematics.

	Long articles	Short notes	Books	Pastimes
June	X			X
July	X	X		X
August	X	X		X
September		X		X
October	X		X	X
November			X	X
December	X	X	X	X

Note: Made by the author.

According to the different genres and functions, in the analyzed issues, mathematics is absent only in opinion. In the case of informative and interpretive fragments, we can find mathematical content both in the form of long articles and short notes. These articles and notes can appear with and without a signature. In the case of annex genres, mathematics appears mostly in the form of pastimes within the section Recipes and Recreations, but we have also found some advertisements for mathematics textbooks. Table 2 shows the monthly distribution of the fragments containing mathematics according to their nature. We see that pastimes were the most common, including some mathematical ideas consistently every month. Long articles and short notes, either informative or interpretive, were also very common, and they were missing only in November. With respect to the role of the mathematical content in them, we have identified some articles and notes about mathematics, while others only contained mathematical ideas in a more instrumental way. Advertisements were less frequent. We could imagine that the readers might not be extremely interested in buying mathematics textbooks; however, we find such advertisements in three different issues.

Articles and notes

Long articles usually took up one full page of the magazine. Short notes were more variable in length, as they were inserted in different places, probably for layout reasons.

We have found 7 long articles; only three of them were signed. Four of these articles used mathematical ideas instrumentally, namely, they included statistical information and graphics. Another article was about finger multiplication and explained how to multiply numbers using hands. One of the signed articles was about topography and explained the introduction and use of some novel instruments. Finally, an interesting, signed article titled *Andar a Ciegas* [Walking Blindfolded] used mathematics as a tool to give a geometric description of the trajectories of blindfolded walkers under certain conditions.

Fig. 4. Examples of some statistical graphics in the magazine [Left: Issue 10 (August 11, 1899). Right: Issue 28 (December 14, 1899)].

We have identified 9 short notes with mathematical content, all without signature, although in one of them it is reported that it is based on a comment by two readers whose names are given. Four of these notes were about statistics and presented statistical graphics. The remaining five were about mathematics: two were follow-ups of the finger multiplication article, one discussed the probability of getting long runs of heads when tossing a coin, one discussed the origin of the numerals, and the last one dealt with magic squares.

As we have just seen, there is an aspect among articles and notes using mathematical ideas that really stands out. It is the extensive and varied use of statistical graphics. We have found five long articles presenting such graphics, with examples of bar diagrams, line graphs, or pictograms (Fig. 4). This strong presence is quite surprising considering that the teaching of statistics in Spain was quite restricted until well into the 20th c.[42] Moreover, Funkhouser[43] attributes the origin of pictograms to Michael George Mulhall in the decade of 1880s, so it was rather unexpected to find such an extensive use so close in time.

The book advertisements

Three books were advertised in the last three months of the year. They were the following:

- *Curiosidades Matemáticas o Comprobaciones Breves de las cuatro Operaciones Fundamentales de la Aritmética* [Mathematical Curiosities or Brief Verifications of the Four Fundamental Operations of Arithmetic], by Marcial Unzué Pérez del Molino.

[42] A.I. Busto Caballero, *History of the Statistics teaching in Spain: a short study*, "BEIO, Boletín de Estadística e Investigación Operativa" 2014, vol. 30, no. 2, p. 161–180.

[43] I.G. Funkhouser, *Historical development of the graphical representation of statistical data*, "Osiris" 1937, vol. 3, p. 346.

- *Tratado de Estadística* [Treatise of Statistics], by Manuel Mínguez y Vicente.
- *Pizarras o Cálculos de Aritmética, Formadas con Sujeción a la Obra Declarada de Texto para los Colegios de la Guardia Civil y Carabineros* [Slates or Arithmetic Calculations, Formed Subject to the Declared Textbook for the Civil Guard and the Carabinieri Colleges], by Manuel Lorenzo Aleu.

Lorenzo's book was addressed to the students of certain police academies. These books were common at that time[44] as a companion to the official textbook used in the corresponding academy. In this case, the book was *Elementos de Matemáticas*[45] [Elements of Mathematics], also written by Lorenzo. The author might have thought that advertising his book in this magazine could get him some potential buyers. This suggests that potential buyers (prospective policemen) were among the readers of the magazine.

Unzué's book was about elementary arithmetic. The author was a teacher who advertised himself as a private mathematics tutor for students of baccalaureate, trade schools, and normal schools. We have not been able to inspect any copy of it, but the title suggests that it could have been used in his classes. Again, this advertisement provides a hint about potential readers of this magazine.

Finally, the book by Mínguez is very different. It is a specialized and lengthy book (3 volumes and more than 600 pages) about statistics in which he covers topics such as Probability Theory, History of Statistics, and theoretical and practical aspects of the discipline. It must be noted that the first textbook on theory and practice of statistics written by a Spaniard, the *Tratado Elemental de Estadística* [Elementary Treatise on Statistics] by José María Ibáñez, dates from 1844[46]. Hence, this book was probably of interest only to a rather narrow public, and it is somewhat strange to have it advertised in this magazine. However, if we recall the strong presence of statistics in the journal, maybe we can understand the reason. In fact, the second volume of Mínguez's book is completely devoted to graphical statistics, and the author even states that 'the main advantage of graphics is that they popularize statistical results, making them available for less educated people'[47].

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[44] A.M. Oller-Marcén, V. Meavilla-Seguí, *Arithmetic in the Spanish Army at the End of the 19th Century: The Textbooks by Salinas and Benítez*, [in:] *Researching the History of Mathematics Education*, ed. by F. Furinghetty, A. Karp, Springer, Cham 2018, p. 180.

[45] M. Lorenzo Aleu, *Elementos de Matemáticas*, R. Velasco, Madrid 1895.

[46] J.P. Vilaplana. *Esbozo Histórico sobre el Desarrollo Histórico de la Estadística en España*, [in:] *El Científico Español ante su Historia: la Ciencia en España entre 1750–1850*, coord. by S. Garma Pons, Diputación Provincial, Madrid 1980, p. 149

[47] M. Mínguez y Vicente, *Tratado Elemental de Estadística*, vol. 2, Imprenta y librería del Diario, Córdoba 1899, p. 322.

The Recipes and Recreations section

Each issue of the journal included puzzles in the form of challenges, riddles, or problems. Not all of them were of a mathematical nature, even if it might appear to be the case at first sight. The editors of the magazine seemed to be well aware of the situation, and they used the word 'problem' for those recreations with mathematical content and the word 'riddle' for the others.

That said, we have been able to identify up to 26 problems with clear mathematical content in this section. This means that almost 90% of the issues published during 1899 contained mathematical recreations. The problems were very often proposed without a signature and provided almost no information about their origin, even if in many cases they were classical. For example, issue 20 (20 October 1899) included the well-known ancient problem of the woman carrying eggs to the market that is related to the Chinese Remainder Theorem[48], and it was claimed to have been submitted by a certain person under the initials of B.C.L.

Visualization problems (11), combinatorial problems (6), and topological problems (5) were the most common. This might be explained by the fact that all these types of problems are easy to state, they do not require specialized knowledge to be solved, and they can be approached by a trial-and-error strategy. On the other hand, verbal problems have a resemblance to school problems that might discourage potential solvers. This explains their relatively low number (4 problems).

The solutions were given in a very schematic way. Usually, only a picture, a description, or the numerical result of the problem was included without any heuristic indications about how they could be obtained. The names and hometowns of the readers who had correctly solved the problem were published together with the solution. These solutions and lists of names appeared soon, usually not later than one or two issues after the problem. Often, the lists of names were rather long, having forty or fifty names (or pseudonyms). Thanks to this, we know that the section attracted the attention of a good number of readers and that the magazine was widely distributed geographically.

Here we must mention the presence in this section of two interesting classical problems of graph theory: the four colors problem and the three utilities problem (Fig. 5). The four colors problem was still rather recent (1852). It had already been stated in the journal "The Atheneum" in 1854 as a serious mathematical problem[49], and it is surprising to find it in a recreational form in this context.

[48] N. Ambrosetti, *Recreative mathematics: soldiers, eggs and a pirate crew*, [in:] *Mathknow. MS&A*, vol. 3, ed. by M. Emmer, A. Quarteroni, Springer, Milan 2009, p. 184.

[49] B.D. McKay, *A Note on the History of the four-Colour Conjecture*, "Journal of Graph Theory" 2013, vol. 72, no. 3, p. 362.

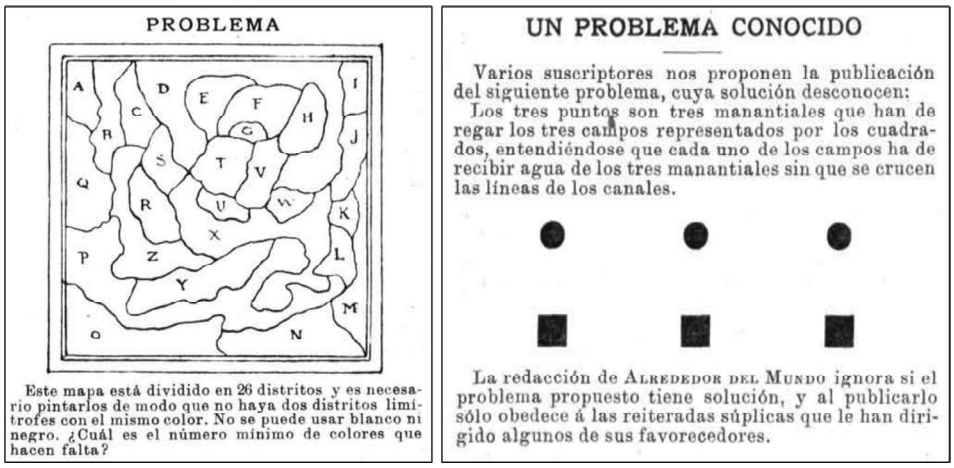

Fig. 5. Two graph theory problems [Left: Issue 8 (July 28, 1899). Right: Issue 20 (October 10, 1899)].

The three utilities problem was also popular in recreational columns and is attributed either to Hendry Dudeney or to Sam Loyd[50]. However, the presence in "Alrededor del Mundo" in 1899 as a seemingly well-known problem (the editor claims that two readers have proposed this problem) predates both and raises doubts about the origin of this problem.

Final remarks

Studying the presence of mathematics in this type of publications, that are unspecialized and are addressed to a general public, can potentially provide insightful information about the role and status of mathematics in society. Our analysis has revealed an unexpected amount of mathematical content. Furthermore, mathematics was not only present in the form of problems, puzzles, or riddles. There was an explicit dissemination or popularization of mathematical ideas, but also the use of mathematics as a tool (modeling, representing data, etc.). So far, our analysis has been mostly descriptive. It would be interesting to adapt or develop some kind of instrument similar to the existing ones for the case of 18th c. press[51], that allowed for a more systematic approach.

[50] N.L. Biggs, E.K. Lloyd, R.J. Wilson, *Graph Theory 1736–1936*, Oxford University Press, New York 1986, p. 142.

[51] M.J. Madrid, C. León-Mantero, A. Maz-Machado, C. López-Esteban, *Matemáticas y educación matemática en la prensa española del siglo XVIII: un instrumento para su análisis*, [in:] *Investigación en Educación Matemática XXIV*, ed. by P.D. Diago, D.F. Yáñez, M.T. González-Astudillo, D. Carrillo, SEIEM, Valencia 2021 p. 403–404.

We do not know if the readers were competent to use or understand those mathematical tools, but, in this regard, the book announcements and the success and participation in the recreational section suggest that it was indeed the case. Moreover, the rather important weight of mathematics in the magazine has another interesting implication: the readers were interested enough in mathematics to guarantee its presence over time. The publication of magazines in Spain at that time was, first and foremost, a business. There were a lot of competitors fighting for the attention of potential customers, and several publications were short-lived[52]. This means that the editors had to be careful when selecting the topics to cover in the magazine, or the pastimes that were proposed to the readers. In fact, it seems that mathematical and scientific recreations were rather popular in Spain by the end of the 19th c., as evidenced by the translation and publication of several books on these topics[53].

The literacy rate almost doubled in Spain between 1850 and 1930[54]. The generalization of a plurality of types of printed products, and particularly the creation of graphic magazines could have played an important role in this phenomenon[55]. Mathematics education can 'be looked upon as something that prepares for full citizenship'[56]. Accordingly, it might be worth analyzing the presence of mathematics in magazines or the interest in recreational mathematics, in the light of other important social and cultural phenomena that were taking place in Spain at that time, such as the increasing associationism[57] or the pedagogical renovation[58].

Our research also points out the interest in studying the relation between serious mathematics and recreational problems. It would be worth exploring how a problem, such as the four colors problem, finds its way from the realm of mathematics to that of puzzles and riddles. It also raises questions about how these recreational problems disseminate between different publications, often from different countries or even continents.

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[52] M.C. Seoane, M.D. Saiz, *Historia del Periodismo en España*, p. 23–68.

[53] J. Bernués, M.A. Crespo Mir, A.M. Oller-Marcén, *150 años de matemática recreativa en España*, "Gaceta de la Real Sociedad Matemática Española" 2025, vol. 28, no. 2, p. 278.

[54] R. García Abad Rocío, A. Pareja Alonso Arantza, K. Zarraga Sangroniz, *¿Sabe leer? ¿Sabe escribir? El proceso de alfabetización en el País Vasco (1860–1930)*, "Revista de Demografía Histórica" 2007, vol. 25, no. 1, p. 34.

[55] J-F. Botrel, *Los analfabetos y la cultura escrita (España, siglo XIX)*, [in:] *Culturas del escrito en el mundo occidental: del Renacimiento a la contemporaneidad*, ed. by A.C. Gómez, Madrid, Casa de Velázquez 2015, p. 251–267.

[56] U. D'Ambrosio, *The role of mathematics education in building a democratic and just society*, "For the learning of mathematics" 1990, vol. 10, no. 3, p. 21.

[57] F. Alía Miranda, M. Ortiz Heras, I. Sánchez Sánchez, A.R. del Valle Calzado, R. Villena Espinosa, *España en Sociedad. Las Asociaciones a Finales del Siglo XIX*, Ediciones de la Universidad de Castilla-La Mancha, Cuenca 1998, p. 15–32.

[58] T. Marin Eced, *La Renovación Pedagógica en España (1907–1936). Los pensionados en pedagogía por la Junta para la Ampliación de Estudios*, CSIC, Madrid 1990.

Another interesting point that is raised by our research is related to authorship. We have already pointed out that most of the articles and notes appeared in the magazine without a signature. This makes it quite difficult to assess not only the quality of the contributions, but also the possible intentionality of the authors when writing their works.

Finally, we have just given results and examples from the 30 issues of the journal published in 1899. Foreshadowing, a first unsystematic approach shows that the presence of mathematics in this magazine was rich and consistent over time. This work provides a starting point to complete our analysis and to extend it to other similar international publications that might allow for comparative studies about the presence of mathematics in non-formal contexts.

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