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Mathematics in the Spanish press: a case study of the 18th century journal *Semanario de Salamanca*

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Old mathematics books and textbooks have always been sources of relevant information for researchers working on the history of mathematics and mathematics education. However, helpful information about this field can also be found in journals, ministerial decrees, or notes. Consequently, this article analyzes the contents related to mathematics or mathematics education in an 18th-century weekly journal published in the Spanish city of Salamanca, *Semanario de Salamanca*. To this end, we conducted a qualitative and descriptive investigation using a content analysis technique, which is widely used in research in this related area. Our results show that despite the fact that the weekly publication under investigation was specialized neither in mathematics nor in science, it included mathematical problems and solutions, mathematical texts, job advertisements for mathematics teachers, mathematics book reviews, and opinions about mathematics. Therefore, the present work expands knowledge of the presence and dissemination of mathematics and mathematics education in 18th-century Spanish society.

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Introduction

History of mathematics and mathematics education examines the development of these disciplines, connecting it with the processes (both of political, philosophical, or scientific nature) that took place in the society of each time (Karp, 2014). In recent decades, many studies in this field have been released, and a variety of topics has been considered, namely: reforms and national policies involving mathematics and mathematics education, mathematicians or mathematics teachers, institutions where mathematics has been taught and learnt, and different tools used to teach or disseminate mathematical knowledge.

Books and textbooks are viewed as primary sources for this area; as Schubring (1987, p. 41) stated, "analyzing old schoolbooks can be regarded as a quite traditional approach to the history of mathematics instruction." Therefore, a multitude of studies dealt with such works. As an illustration, Craik (2015) analyzed the book on arithmetic called *Methodi sive compendii mathematici*, which was written for King James VI of Scotland in 1586 (who became King James I of England in 1603). Oliveira and Schubring (2021) studied the transmissions of Lacroix and Legendre's books to Colombia and Venezuela during the 19th century. For their part, Van Zanten and Van den Heuvel-Panhuizen (2021) addressed addition and subtraction in primary school Realistic Mathematics Education oriented textbooks, which saw the light in the Netherlands between the onset of Realistic Mathematics Education and today.

The fact is that, in addition to books and textbooks, different journals have included mathematical contents throughout history, which have been studied by various authors. For example, the recreational mathematics columns contained in two American journals from the end of the 19th century were examined by Zelbo (2019). Fiocca (2017) focused on the *Bullettino di Bibliografia e di Storia delle Scienze Matematiche e Fisiche* (1868–1887), a European journal dedicated to the history of mathematics and physics. Despeaux (2007) analyzed the role of university-affiliated mathematical journals in Britain (1837–1870) aimed at junior mathematicians who wanted to launch their research. Meavilla and Oller-Marcén (2018) studied the Spanish journal *Miscelánea Turolense* published between 1891 and 1901. This last journal included information about mathematicians from the Spanish region of Teruel, as well as books with mathematical content written by inhabitants from Teruel (or by people connected to this region).

However, these studies are not as common in Spain. Hence, we consider the study of the Spanish press relevant from the perspective of the history of mathematics and mathematics education. Due to several reasons, we have concentrated on the 18th century.

In Spain, such a century began with a change in the reigning dynasty. The new Bourbon Kings aimed to modernize Spanish society, and they favored the study of science and technology, although in dissimilar ways (Ausejo and Medrano, 2010).

As Ruiz Berrio (1988) stated, the Spanish Enlightenment movement advocated extending primary education to all citizens, while superior education (for example, universities and military academies) was mainly for nobility, ruling classes, or the bourgeoisie. However, there was no national plan for educational reform in Spain in the 18th century. Consequently, some local authorities, institutions, foundations, and even individuals (civil or religious) tried to improve the situation with diverse initiatives.

Religious orders, and in particular Jesuits, who dominated youth education until that moment, lost influence during this century, especially after their expulsion from Spain in 1767, and a period of promotion of civil and military institutions began. These institutions needed teachers with mathematical knowledge so as to ensure the teaching and learning of this subject. Such teachers were not mainly members of religious orders; they belonged to civil or military society, which meant a progressive displacement of the religious orders from the Spanish educational and scientific control (Gómez, 2011).

To a lesser extent, science teaching at universities was also encouraged. Certainly, mathematics professorships were founded or renewed, and professors should pass an exam to access them. Furthermore, a reform of the university curricula was also supported to update, among other contents, mathematics teaching (Rico and Maz, 2005).

Over the last few years, studies about 18th-century Spanish mathematics books, mathematicians and mathematics teachers have been conducted. Regarding Oller-Marcén and Muñoz-Escolano (2019), they studied the conceptions of mathematics, its teaching and learning in the book *Compendio Mathematico*, which was written by Thomas Vicente Tosca and published in 1707. Maz and Rico (2009) analyzed the book *Liciones de Mathemáticas* written by Thomas Cerda and released in 1758. Blanco (2013) compared the introduction of calculus in Spanish and French military educational institutions through the works of Pedro Padilla y Arcos and Étienne Bézout.

This article focused on the press and its contribution to the diffusion of ideas related to mathematics and mathematics education. In accordance with Larriba (2013), the 18th century was the century of the press. Many journals appeared in Europe and even in America, given that the enlightened movement found an effective way of disseminating knowledge in the press. In Spain, since the middle of the 18th century, journalism played an essential role in the political and cultural life of the country. Proof of that is the number of journals published, their periodicity and impact, and the different types of journals. However, even during the second half of the 18th century, Spanish authorities did not always adopt a pro-press position. At certain moments, the publication of newspapers and journals was banned and persecuted, while at others, it was encouraged (Sánchez Hita, 2007).

Press was also a way of disseminating scientific knowledge to the citizens who were able to read and pay the subscriptions. In Spain, since the middle of the 18th century, some journals, whose initial purpose was not spreading science, included reviews of scientific books and even scientific or technical articles on their pages (Clément, 2017).

For that reason, different authors have considered the role of mathematics in the 18th-century Spanish press. For example, Madrid and López-Esteban (2018) analyzed the journal *Semanario Literario, y curioso de Cartagena*, a periodical publication that began in 1786 and continued for almost a year and a half, and incorporated some mathematical contents. Also, Oller-Marcén (2019, 2020) examined problems contained in two diaries published in Barcelona and Madrid. These previous studies allowed us to establish our study's research agenda, develop an appropriate methodology and compare our results with previous research.

Therefore, we analyze the mathematical contents included in the periodical publication: *Semanario erudito y curioso de Salamanca* (also called *Semanario de Salamanca* and *Semanario Literario y Curioso de Salamanca*) so as to identify and classify them. It will help us to understand informal aspects of mathematics and mathematics education at the time, for example, the mathematical knowledge that the readers had, the mathematics topics that interested them, and naturally how they used this type of publication as a dissemination platform for a different kind of knowledge.

We have chosen this journal for several reasons. According to De la Flor (1988), the Spanish city of Salamanca lived a second

Renaissance during the last part of the 18th century, due to, among other facts, the recovery of university life after years of decline. The journal *Semanario de Salamanca* shows the social and cultural movement that Salamanca experienced at that time. As a result, it is one of the fundamental journals of the Spanish Enlightenment.

This journal was published between 1793 and 1798, consisting of 20 volumes and 586 issues. Although it was called a weekly publication, it was released twice a week, particularly on Tuesdays and Saturdays. For almost a year, from the 2nd of April 1795 to the 31st of March 1796, it was published three times per week, particularly on Tuesdays, Thursdays, and Saturdays (De la Flor, 1988).

Furthermore, the journal had a brief continuation in the first half of 1800, since three issues of a journal entitled *Continuación del Semanario de Salamanca* were found with that date. In December 1800, the promoters of this journal wanted to publish a "Spirit" of *Semanario*, but there is no evidence that this happened (Álvarez de Miranda, 2011).

The number of pages per *Semanario* was variable, although the most common length was four sheets. Conforming to the initial plan, the journal was divided into two sections, namely: a literary or scientific one, which included articles on diverse topics (agriculture, history, geography, or physics) considered adequate, valuable, and interesting for the readers by the editor; and a second one which contained news about Salamanca (De la Flor, 1988).

This journal was founded by a presbyter, Francisco Prieto de Torres, who was also its editor and author. Though it is possible that there were more editors in some issues. Another relevant fact is that the journal had many collaborators, although their identity is usually unknown because of the usage of pseudonyms (De la Flor, 1988).

Semanario was not only distributed in Salamanca but also in other Spanish cities such as Madrid, Valladolid, Barcelona, and Córdoba. It had an important number of readers who were aristocrats, architects, printers, musicians, members of the universities, the Church, the Army, and so on (De la Flor, 1988). The journal was targeted at the general public. Thus, all citizens who could pay for it could read it.

More general information about this journal can be found, among other authors, in De la Flor (1982, 1988).

Methodology

This study presents qualitative, descriptive, and ex-post-fact research focused on analyzing old texts from the perspective of the history of mathematics and mathematics education. We have used content analysis as an analysis technique following previous studies in journals (Madrid and López-Esteban, 2018; Meavilla and Oller-Marcén, 2018).

The search for *Semanario de Salamanca* was performed through the Hispanic Digital Library from the Spanish National Library and the Spanish Digital Library of Historical Press. Issues 1–447 and 475–586 were found, which were published between 1793 and 1798. Therefore, we have analyzed around 560 issues.

Although this *Semanario* had different names during its publication, we have adopted the general name *Semanario de Salamanca* to refer to the whole collection.

We defined every journal entry that includes content related to mathematics or mathematics education as the unit of analysis. These units were read, analyzed, and categorized using a previously designed form (Madrid et al., 2021, 2022). The following elements were considered:

- Data about the issue of the journal and publication date.
- Author/s (when included).
- Type of mathematical content:

  - Mathematical problems related to different mathematical knowledge and contextualized in different situations.
  - Solutions to mathematical problems, methods of resolution, and proofs for the solutions.
  - Texts which divulge contents about mathematics or mathematics education.
  - Texts which reflect opinions, attitudes or beliefs about mathematics or mathematics education.
  - Biographies and information about mathematicians, mathematics teachers, or people whose mathematical knowledge was recognized.
  - Advertisements on mathematics instruction or jobs for mathematics teachers.
  - Book advertisements and reviews.
  - Other mentions about mathematics or mathematics education.

Results

Mathematics was not the main content in *Semanario de Salamanca*, given that other topics enjoyed a greater presence. Nevertheless, it is possible to find some mathematics contents over the different years of publication of *Semanario de Salamanca*. We analyze such content conforming to the aforementioned categories.

Solving problems. Several issues of *Semanario* posed mathematical problems and encouraged its readers to solve them. For example, in a few issues of 1794, problems and solutions were constantly exchanged. All started when *Semanario de Salamanca*, issue 33, published the following problem on Tuesday the 21 January 1794:

A greyhound ran after a hare. At the beginning of the run, the hare, whose jumps measured a foot and a half, was four jumps ahead of the dog. Finally, the dog caught the hare. How many jumps needed this dog to reach the hare, considering that the dog jumps measured three and a half feet and that while the hare jumped twice, the greyhound jumped just once? (Semanario erudito y curioso de Salamanca, 1794a, p. 54).

One week later, *Semanario de Salamanca* included three different solutions to this problem (Semanario erudito y curioso de Salamanca, 1794b, pp. 73–76).

The first one was written by someone called "Licenciado Pez Putufes". Here we see that as De la Flor (1988) said, writing under a pseudonym was common in this journal. The author used equations so as to solve the problem and incorporated a detailed explanation of his resolution method. In summary, he indicated:

Let x be the number of times the hare jumped since the greyhound started its race. Considering the hare jumps' measure and its advantage, the hare ran $3x/2 + 6$. Knowing the hare jumped twice while the greyhound jumped just once, let $x/2$ be the number of the greyhound jumps. Heeding the measure of the dog jumps, the greyhound ran $7x/4$ when he reached the hare. Therefore, he obtained the following equation:

$$\frac{3x}{2} + 6 = \frac{7x}{4}$$

He multiplied both members by 4 to eliminate the fractions:

$$6x + 24 = 7x$$

Then, he put the unknown in one member. To do so, he explained that if $7x$ was transferred with the opposite sign to the other member, it would result in a negative quantity. Hence, he transferred $6x$ with the opposite sign, and he got $x = 24$.

In such manner, the author obtained the correct solution: since the greyhound began its run, the hare jumped 24 times until it was caught by the greyhound, which jumped 12 times.

The author checked his solution. For the hare, he multiplied 24 times by a foot and a half, added six, and obtained 42 feet. For the greyhound, he multiplied 12 by three and a half feet and obtained 42. By doing so, he checked that both animals covered the same distance.

The second author called himself "San Francisco de Salamanca". He included two different resolution methods.

Firstly, he solved the problem using algebra like "Licenciado Pez Putufes", but he posed the problem differently. Considering that the greyhound and the hare covered the same distance, he multiplied the greyhound's feet per jump by its number of jumps. This quantity equals two hare jumps multiplied by the measure of its jumps or the hare's feet per jump multiplied by double the greyhound's jumps. Let x be the number of greyhound jumps. The author obtained the following equation:

$$3x + \frac{x}{2} = 3x + 6$$

He put every unknown term in one member. He reduced and cleared the unknown and obtained $x = 12$. The author said that there are other ways to resolve this problem, but he considered this one enough for intelligent people on this topic.

Despite that, he added another method of resolution:

The greyhound ran a half foot more than the hare per jump, and the hare had an advantage of 6 feet.

A half foot of the first jump plus a half foot of the second jump is 1. So on until it sums 6. Therefore, the greyhound jumped 12 times.

Then the author included two comments. In the first one, he said that if the greyhound had four jumps of advantage (instead of the hare), the greyhound would reach the hare with 28 jumps. Here the intention of the author is unclear, and we do not know if the author or the editors inserted some mistake in this comment.

In the second comment, the author verified the initial solution by proving that both the hare and the dog covered the same distance.

Algebra was quite common for education at the time in different institutions (military academies, universities) and at different levels, as can be seen in Madrid, León-Mantero, and López-Esteban (2020). Thus, its inclusion in *Semanario* showed the interest in this content in a non-formal context, the mathematical knowledge that the readers had, and how useful they considered it to solve problems. Furthermore, both authors included a modern treatment of algebra, although not all books published at the time used it (Madrid et al., 2020).

The third author called himself "El no-Matemático = Rojas", which can be translated as the no-mathematician = Rojas, and he solved this problem using proportions.

Each greyhound's jump measured 2 and 1/3 of the hare's jumps. Consequently, per each greyhound's jump, the hare lost 1/3 of its jumps. With the intention of knowing how many jumps would need the greyhound to reach the hare, the author formed the following proportion:

$$1/3 : 1 :: 4 : x \quad = \quad \frac{4 \times 1}{\frac{1}{3}} \quad = \quad \frac{4 \times 3}{1} \quad = \quad 12$$

In actual notation, this proportion would be:

$$\frac{\frac{1}{3}}{1} = \frac{4}{x}$$

Hence, the greyhound needed 12 jumps to catch the hare, which had jumped 28 times since the start of the race, and they both ran 42 feet.

Before the spread of algebra, arithmetical methods were quite relevant so as to solve different problems that can also be solved with equations. With regards to proportionality, it was a crucial tool, as can be seen, for example, in the method of fake position (Orts Múñoz, 2007). In *Semanario*, we can observe how both methods (arithmetical and algebraic) coexisted, although the first printed book with algebra contents was published in Spain in 1552 (Madrid et al., 2020).

The editor of *Semanario* said that these three authors deserved a reward for sharing their wise productions, and he included a new problem dedicated to them in order to show them his affection:

He offered these three men 1600 pesos (Spanish money at the time). However, they should distribute them following these instructions: Licenciado Pez Putufes would get one part, Mister Rojas would get two parts minus 13, and San Francisco would get as much as the other two together plus 9. How much money would each one of them get?

On the 4 February, in *Semanario* issue 37, we found a solution to this problem (Semanario erudito y curioso de Salamanca, 1794d, p. 98). The author of this solution was "El procurador que no procura" (The procurator who does not procure):

Licenciado Pez Putufes got 269 ½ pesos, Señor Rojas got 526 pesos and San Francisco got 804 ½ pesos. With a view to checking this solution, the author added all these quantities and got 1600 pesos.

The journal editors reported that 10 other people submitted correct solutions for this problem, including previous authors like Licenciado Pez Putufes or Mister Rojas.

Moreover, the editors posed new problems sent by the readers so as to increase the public's amusement. The target audience of these problems were the readers who had already answered previous problems and other amateurs in the helpful study of mathematics. In particular, they included five problems.

The first one was sent by "el griego de San Francisco" (the Greek of San Francisco):

There were four companions. One said to another, if you double my money, I will give you one peso fuerte, and so they did. He told the same thing to the other two companions, and they both did it again. Finally, he ran out of money. How much money did he initially have?

On 08/02/1794, *Semanario* published an answer for "el griego de San Francisco" written by "El Abate a lo marcial" (the Abbé in a martial way) (Semanario erudito y curioso de Salamanca, 1794e, p. 112):

The solution given was that the first one initially had 17 and ½ reales, and at the end, the other three companions would get 20 reales. To confirm his solution, the solver said:

- The first one had in his pocket 17 and ½ reales.
- The second one doubled the money. Therefore, together they had 35 reales.
- From these 35 reales, the second one got 20 reales (one peso fuerte).
- Then the first one had 15 reales.
- The third one doubled the money. Thus, together they had 30 reales.
- The third one got 20 reales (one peso fuerte).
- Then the first one had ten reales.
- The fourth one doubled the money. Hence, together they had 20 reales.
- The fourth one got 20 reales (one peso fuerte).

Another problem included on the 4 February, *Semanario* issue 37, was sent by "El procurador que no procura" (Semanario erudito y curioso de Salamanca, 1794d, p. 99):

A merchant owed a certain number of reales and had no money to pay them. He agreed with his creditor to pay him two-eighths with taffeta, four-ninths with canvas, and two-sevenths in baizes. To end his debt, he gave his creditor ten varas (old Spanish length measure) of cloth. Considering that each vara costs 30 reales, how much was the debt?

Also, on 08/02/1794, "El Abate a lo marcial" spoke about this problem, saying it is not original because a similar one was solved by Juan Perez de Corachan in the third question of the fourth part of his second book (Semanario erudito y curioso de Salamanca, 1794e, p. 112). As stated by this author (although with a mistake in the name), Juan Bautista Corachan's book, whose first edition was released in 1699, included a problem (Corachan, 1719) very similar to the one published in *Semanario*.

El hidraulico (The hydraulics) asked three questions (Semanario erudito y curioso de Salamanca, 1794d, pp. 99-100):

- Question 1. Two people should divide equally 400 reales. However, initially, they took all the money they could, but then they decided to share it peacefully. To do so, the first one had to give back a third of what he took and the second 1/5. In this way, they both got the same money: 20 reales. How much money did they take initially?
- Question 2. In a particular church, there are two golden goblets and a golden paten, which cost 30,000 reales. This paten and the first goblet cost three times more than the second golden goblet, and the paten and the second goblet cost the same as the first goblet. How much costs each goblet?
- Question 3. Two people have some reales. If the second one gives 12 reales to the first one, then this will have six doblados more than the second one. However, if the first one gives 15 reales to the second one, this will have ten times more money than the first. How many reales has each of them?

On the 1 February 1794, another problem was incorporated, and it is said that a curious posed this problem for the amusement of the public and as entertainment for mathematicians (Semanario erudito y curioso de Salamanca, 1794c, p. 92):

How many wheat grains had a Castilian fanega (Spanish Bushel) of wheat, and how many times should the mill wheel turn to grind it?

Unfortunately, *Semanario de Salamanca* shared the following comment on the 11 February 1794: we have received several solutions to the posed problems, and we do not dare to insert them in our newspaper because we know that the public, and especially our subscribers, receive such writings with displeasure (Semanario erudito y curioso de Salamanca, 1794f, p. 120).

These problems, like the one with the hare and the greyhound in which it is studied when one would reach the other and problems related to business situations, were quite typical for education at this time. For example, they are included in the book from Garcia (1782) for the students from the University of Salamanca or the book of Padilla y Arcos (1756) for the students from the Royal Academy of the Spanish military Quartel de Guardias de Corps.

Sometime later, a problem released in another journal received a solution in this *Semanario*. Specifically, issue 204 published on 9 July 1795 included the solution to a problem posed by D. Martin Broussein in another journal: *Diario de Madrid*, on 7 June.

The problem was the following: Given a curve AMC and a luminous point L in its plane, determine the curve whose tangents are all the reflected radii (Semanario erudito y curioso de Salamanca, 1795e, 28–29). *Semanario* contained an image of this problem (Fig. 1).

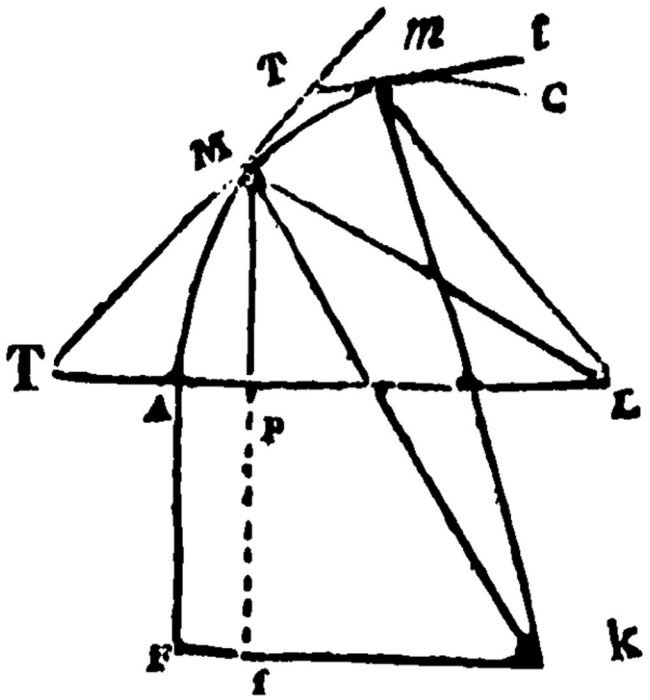

Fig. 1 Graphical representation of a curves problem. Image included in *Semanario erudito y curioso de Salamanca* (1795e, p. 28).

This problem involves calculating the evolute of the reflected radii by a luminous point on a curve. The study of evolutes was part of printed mathematics books from the last quarter of the 18th century in Spain, which contained infinitesimal calculus content as applications to studying curves. In particular, they studied differential expressions of the tangent, normal, maximum and minimum ordinates and the evolute of a curve. Among these books, we have the treatises of Benito Bails (1779), who was director of mathematics at the Royal Academy of San Fernando, Juan Justo García (1782), who was a professor at the University of Salamanca, and Pedro Giannini (1795), whose book was written for his students of the *Real Colegio Militar de Artillería* of Segovia.

Semanario dedicated more than a one-page resolution to this problem using infinitesimal calculus. Although the author did not include the final solution, he only showed how to solve it. The author followed Newton's geometrical approach to answer the problem. However, he used the notion of differentials developed by Leibnitz, which according to León-Mantero, Santiago, and Gutiérrez-Arenas (2020), was the most common approach in the Spanish 18th-century mathematics books.

Hormigón (1994) said 18th-century mathematics is infinitesimal calculus. Thus, the inclusion of this problem shows an interest in disseminating the last mathematics advances in *Semanario*.

Although the evolute of a curve was part of the contents studied in several books and numerous examples were included in them, only Giannini's *Curso Matemático* (Mathematical Course) (1795) has a proposition that leads to the same problem (Figs. 2 and 3).

However, the solver did not use the word evolute or other related concepts, such as *osculatory circles*, in his approach. It could be because this publication was aimed at the general public. Therefore, the problem was written with a more colloquial vocabulary than the one used in the books at the time.

PROPOSICION XLVIII.

320. Dada la curva *AMN* referida al focus *F*, determinar la equacion á la evoluta *ST*, esto es, á la curva que pasa por los centros *P* de los infinitos círculos osculadores á la curva dada. *Fig.* 84.

Fig. 2 Evolutas problem from Giannini's Curso Matemático. Image of the Proposition included in the book (Mathematical Course, Volume III) (1795, p. 299).

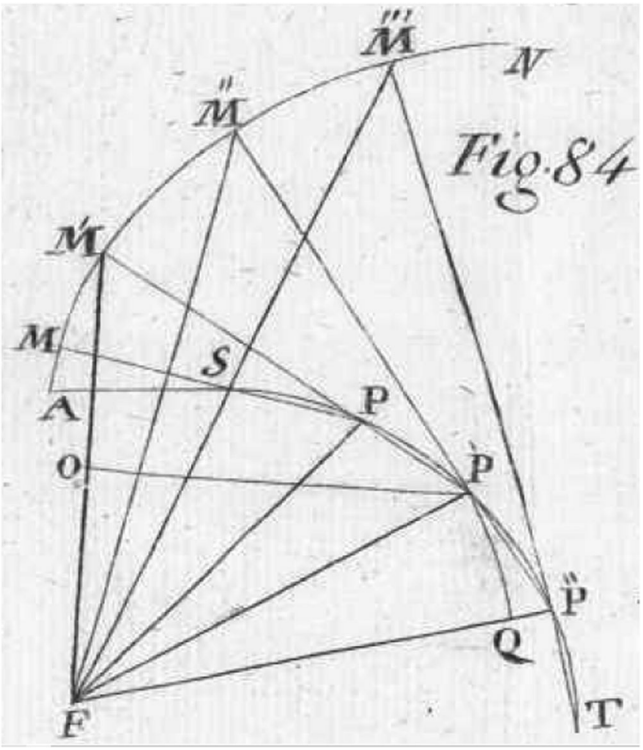

Fig. 3 Graphical representation of Proposition 48. Figure 84 is included in Giannini's *Curso Matemático* (Mathematical Course, Volume III) (1795, sheet VIII).

On 03/12/1795, *Semanario erudito y curioso de Salamanca* (1795i, pp. 225–227) spoke again about Martin Brusein. They said that he was a French clergyman, a professor of Mathematics and Greek and Hebrew languages at the Bordeaux Museum, and he invented a new type of hydraulic machine. According to Carabias Torres (2020), Brusein also published on more than one occasion in the journal *Diario de Madrid*.

Book advertisements and reviews. *Semanario* gathered not only mathematics problems but also book advertisements on mathematics. For example, issue 62 of *Semanario de Salamanca* (1794h, p. 91), released on 03/05/1794, announced the publication of the second edition of the book *Elementos de Aritmética, Algebra y Geometría* (Elements of arithmetic, algebra, and geometry), whose author was the professor Juan Justo García from the University of Salamanca, and whose first edition was published in 1782 (Garcia, 1782). The advertisement explained that the author had corrected and completed this new edition, and included the book price. This book was quite relevant for university education at the time. A Royal Decree of 1807 (Real Cédula, 1807) stipulated that universities should use the book of the professor Juan Justo García as a text for teaching the elements of arithmetic, algebra, and geometry and the application of algebra to geometry.

Juan Justo García's book is not the only mathematics book mentioned. *Semanario*, on 06/02/1796, included a brief review of the book *Compendiosa explicacion de Cuentas por enteros y quebrados* (Compendium explanation of counts by integers and fractions), whose author was not specified. The review explained that the book was clear, brief, general, cheap, and easy to carry or send by post. According to this review, the book included the most straightforward methods for making all kinds of adjustments and other methods entirely new to the difficulties of fractions. Furthermore, it added that the book was helpful to everyone, whether to learn or not to forget what has been learnt. Only consummate arithmetic teachers would have a reason not to buy it (Semanario erudito y curioso de Salamanca, 1796a, pp. 126–127).

Not only books but also other journals were mentioned in *Semanario*. As an illustration, on 28/2/1797, *Semanario erudito y curioso de Salamanca* (1797b, pp.135–136) spoke about the journal *Pasatiempo literario*, which would be published in the Spanish city of Alcalá de Henares and would contain mathematics among its contents.

Job advertisements. *Semanario de Salamanca* (1794i, pp. 120-122), released on the 19 August 1794, incorporated a job advertisement for a professor of mathematics in the institution Estudios Reales of Madrid. This publication displayed that the previous teacher, Antonio Rosell, accomplished a promotion, and what the future professor should do and how to achieve this job.

The salary offered was 13,200 reales de vellón per year. Carabias Torres (2020) compared this with other mathematics professors' salaries. For example, it was smaller than the salary of a mathematics professor at the University of Salamanca.

The future professor must teach methodically the different branches of mathematics every school day during the academic year for two hours, alternating and dividing his teaching with the other professor of the same faculty. Also, every academic year he should begin again with the mathematics course.

To achieve this job, the candidates should know Latin, and they had to pass the following opposition exam: First, they had 24 h to write in Spanish some dissertation on a subject of the faculty that would be chosen by chance. For this reason, they should work inside the library, with only a scribe's help and the books they had requested. Then they had to explain their dissertation, give the foundations of their work, and respond to the examiners' questions. Later, they had to perform another public exercise in which they should explain another point, also chosen by chance, within the same term of 24 h. In this exercise, candidates suffered the replies of two of their competitors, and they had to solve the difficulties or problems they posed to them.

Advertisements for teachers. *Semanario* included advertisements for mathematics teachers. For instance, Vicente Calvo, who was an assistant, offered to instruct in the count, arithmetic, and other mathematics problems, everything as quickly as possible and for a fair price (Semanario erudito y curioso de Salamanca, 1795c, p. 182).

Also, *Semanario de Salamanca* published on 12/4/1794 an entry on Miguel Vicente Marquez. The latter lived in Salamanca and was a water carrier; Carabias Torres (2020) found this surprising because this job was one of the most undervalued and underpaid of the time and it did not require mathematical knowledge. However, he offered to be helpful to the citizens by giving instruction in the main branches of mathematics for fair prices. For example, he would teach arithmetic; geometry (that he

considered necessary for architects and engineers); flat trigonometry to measure distances without reaching them; algebra principles, and how to solve all kinds of problems. (Semanario erudito y curioso de Salamanca, 1794g, pp. 39–40).

Texts with information on mathematics. Manuél Sevald (Semanario erudito y curioso de Salamanca, 1795a) addressed the history of science, and among his comments, he included ideas on mathematics. Articles about the history of science were also part of other Spanish journals at the time, as seen in Madrid and López-Esteban (2018).

On 17/1/1797, *Semanario erudito y curioso de Salamanca* (1797a) incorporated an article on architecture, which the author related to mathematics. He considered it is relevant that architects knew arithmetic and geometry and spoke about applying proportions to architecture.

Information on mathematicians or mathematics teachers. Classical mathematicians are mentioned in *Semanario*. For example, *Semanario de Salamanca*, issue 244 of the 10 October 1795, expounded the history of the seven wise Greek men. Among them, it was considered Thales Milesio, who, according to the text, was the one who taught geometry and astronomy to Greeks (Semanario erudito y curioso de Salamanca, 1795g, p. 33).

Not only were classical mathematicians included, other mathematicians, such as Descartes, Newton or Leibnitz, were mentioned, for instance, in *Semanario erudito y curioso de Salamanca* (1795h).

Semanario erudito y curioso de Salamanca (1796b, 1796c), published on 09/02/1796 and 11/2/1796, contained a version of the author T.D. on the eulogy for Jorge Luis le Clerc, Count of Buffon, carried out by the Secretary of the Science Academy of Paris. Among other comments, this author said:

Initially, it seemed that Buffon wanted to devote himself to mathematics, a field considered the foundation and key to natural knowledge since Newton. Mathematics had become in France a fashionable science, partly because Maupertiùs was a geometrician. However, if Buffon occupied himself for some time in these enquiries, it was to study himself, test his force, and know the temper of his genius (Semanario erudito y curioso de Salamanca, 1796b, pp. 129–130).

As for Spanish mathematicians, Semanario erudito y curioso de Salamanca (1796d, pp. 197–198) on 25/06/1796 included a book review of *Del origen y reglas de la Música* (On the origin and rules of music), written by Antonio Eximeno. Such review said that he was one of the greatest mathematicians of the century. As De Guzmán Ozamiz and Garma Pons (1980) manifested, Eximeno's international fame is mainly due to his work on music theory. However, they agreed that Antonio Eximeno acquired a broad mathematical culture that allowed him to stand out in the Spanish mathematical panorama of the time.

It was not the only mention of Eximeno in *Semanario*. Throughout various issues, the relationship between mathematics and music was considered from different points of view. Eximeno was mentioned several times, for example, in *Semanario erudito y curioso de Salamanca* (1797c).

Other Spanish mathematicians were also cited. For instance, the name of Pedro Ciruelo appeared in *Semanario erudito y curioso de Salamanca* (1795f) of 15/08/1795, due to his link with the University of Salamanca. There he studied for ten years, and later he was offered a professorship (Ayala, 1993).

A mathematics teacher, Pedro Enguera, was mentioned in *Semanario erudito y curioso de Salamanca* (1795d, p. 8) of 2/4/1795 because he modified the book *Varia Commensuracion para la Escultura y Arquitectura* (Various Commensuration for Sculpture and Architecture), written originally by Juan de Arphe y Villafañe.

Even a woman and her relation to mathematics were introduced on *Semanario* 1/11/1794. An author called "El antiquario" (the antiquarian) spoke about the history of a relevant woman from Salamanca: Cecilia Morillas, who was born in 1539. Among other facts about her, he said that she was admired for experts in cosmography, mathematics, and astrology (Semanario erudito y curioso de Salamanca 1794j, pp. 68-69). This fact is confirmed by Boyle (2015, p. 293), who stated the following:

Spanish intellectual and artist Cecilia Morillas (b. Salamanca, 1539–1581) often used her artistic skills to utilize, illustrate and participate in medical and scientific conversations and conventions relating to personal health, cosmography, mathematics, and botany, among other topics.

Opinions on mathematics. *Semanario erudito y curioso de Salamanca* (1795b, pp. 127–133), released on 28/2/1795, included a seven pages section titled Mathematics, whose author was Pedro Alonso de la Avecilla. This author had a negative opinion of mathematics and he declared himself an enemy of it.

The text explained that he had a conversation with a friend who wanted his son to study mathematics because he found it beneficial to humankind. Sometime later, according to the author, his friend's son was sick because he could not stand such a study, and the devilish mathematical language possessed his imagination.

The author said that he did not understand mathematics, but seeing what it had done to his friend's son, he was an enemy of it, and he tried to convince his friend that his son should not study it. He said mathematics has exceptions because everything cannot be demonstrated or discovered. For example, the geometrical proportion between diameter and circumference is not precise. Because of that, if the diameter of the Earth is 3000 leguas (old Spanish length measure), its turn will be 9000 and something more. He thought that this "something more" made all the calculations of astronomers and mathematicians untrue.

Besides, he considered the difficulties encountered in many branches of mathematics insurmountable. For example, Pedro Alonso de la Avecilla said that mathematics progress had helped navigation in that century. However, he even blamed mathematics and this progress for the deaths of many people at sea, because people previously died on land instead of on water. The author knew that his comments might bring controversy and could offend some journal readers.

Another opinion about mathematics and its learning is included in *Semanario erudito y curioso de Salamanca* (1798, pp. 57–61) of 28/4/1798. It was written by a woman, who called herself A. F., in the text, some information about herself can be found. She said that she has not deepened in sciences, she had only very few ideas about it, because of her limited talent or because women were not allowed to study it at schools. She added that it was not possible for her to devote herself to it as she would have liked it. Commenting that she would have liked to study geometry because she liked this science.

Then she spoke about mathematics, saying that they are instrumental and necessary, and she recommended every young man who wishes to profit in all sciences to study them. However, she considered that religion principles should be mastered before. In addition, she said that theology, mathematics and physics were three essential sciences.

This opinion piece is another example of the difficulties that many women have had in accessing the sciences. For example, the 18th-century Spanish author María Andresa Casamayor y de la

Coma published her mathematics book under a male anagram of her name (Bernués Pardo and Miana Sanz, 2019).

Conclusions

This study shows how mathematics contents were part of a weekly publication from the 18th century, although these contents were not typical. *Semanario de Salamanca* included some problems and solutions which were occasionally posed so as to increase the amusement of the public.

The topics of the problems incorporated were diverse, though business and commercial exchanges were common. Moreover, infinitesimal calculus was included in *Semanario*, showing how the new advances in mathematics reached the population not only through books, schools, or formal institutions.

Some authors included different methods for solving a problem, which the subscribers could learn. This habit of integrating mathematical problems and solutions in a journal is not exclusive to this *Semanario*, as we see in Oller-Marcén (2020, 2019) and Madrid et al. (2022).

However, problems caused diverse reactions. On the one hand, many readers sent their solutions just a few days after a problem was posed. On the other hand, *Semanario* said that some subscribers found them displeasing.

Semanario mentioned famous mathematicians from the past and different mathematicians and mathematics professors at the time, such as Juan Justo García, Antonio Rosell, and Antonio Eximeno. Furthermore, inhabitants of the city were cited in the journal. However, as seen before, they were not the only ones, maybe because of the dissemination of the journal in different Spanish cities.

Institutions, where mathematics was taught, were also noted, for example, the Academies of London, Petersburg, and Isla de León. Mathematics books were referred to in its pages as well, and job offers were part of it too.

Semanario also showed the connection between mathematics and other fields, such as architecture, music, and other sciences. Some authors expressed their opinions about mathematics in this weekly publication, where we can see their beliefs and attitudes toward it. Again, we can see different points of view in these opinions. Some readers considered mathematics helpful, while others did not.

In summary, *Semanario* acted as a vehicle for disseminating knowledge. In this sense, it shows the dissemination of mathematics and mathematics education in a non-formal environment, revealing the real interests and opinions of the contributors and subscribers who participated in it.

This content can be compared with the studies of Meavilla and Oller-Marcén (2018) and Madrid and López-Esteban (2018). We can see some similarities showing that spreading mathematics and mathematics education ideas were quite common in the Spanish press. However, they did not have a central role.

In conclusion, periodical publications can be sources of relevant information on this topic. They show us how mathematics and mathematics education were part of society and shed light on trends and opinions. This line of research displays the presence of mathematics beyond formal education and research. Moreover, it reveals how publications, which were not specialized in science, were used to disseminate this content to 18th-century Spanish society.

Future studies would allow us to compare other periodical publications with this *Semanario*, especially to analyze if the contents of mathematics and mathematics education were similar or included different aspects.

The 18th century was the century of the press, not only in Spain but also in Europe and even America. For instance, Clément (2017) said that the journal *Gazeta de Literatura de México* (1788–1795) contained articles about mathematics. This study will guide researchers to trace the mathematical presence in written publications (such as journals, newspapers, and weekly publications) of their country or region.

Data availability

The datasets analyzed during the current study are available in the Hispanic Digital Library from the Spanish National Library and the Spanish Digital Library of Historical Press.

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Ethical approval

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Additional information

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