

Postage stamps as semiotic and discursive mediation in mathematics education: a visual and cultural approach in the algerian context

الطابع البريدية كوسيلة وسائطية سيميائية وخطابية في تعليم

الرياضيات: مقارنة بصرية وثقافية في السياق الجزائري

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Abstract:

This article investigates the pedagogical role of postage stamps in the teaching of mathematics in Algeria, through a semiotic and discursive approach. As visual objects bearing cultural and scientific meaning, stamps provide a mediation between image, language, and knowledge. The study is based on a corpus of Algerian stamps depicting mathematical figures and concepts, analyzed in the context of their reception in schools. It demonstrates that these materials stimulate learner engagement, enrich comprehension, and foster the development of linguistic competencies. The integration of stamps highlights Algerian cultural heritage and promotes a contextualized, inclusive, and interdisciplinary pedagogy.

Keywords: Postage stamps; visual semiotics; discursive analysis; cultural dimension; language pedagogy.

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ملخص:

يتناول هذا المقال الدور التربوي للطوابع البريدية في تعليم الرياضيات في الجزائر، من خلال مقارنة سيميائية وخطابية. وباعتبارها أدوات بصرية تحمل دلالات ثقافية وعلمية، توفر الطوابع وسيلة وسيطة بين الصورة واللغة والمعرفة. تستند الدراسة إلى مجموعة من الطوابع الجزائرية التي تُجسّد شخصيات ومفاهيم رياضية، تم تحليلها في سياقها المدرسي. وتُظهر النتائج أن هذه الوسائط تُحفّز تفاعل المتعلمين، وتُثري فهمهم، وتُثمّن مهاراتهم اللغوية. كما أن إدماج الطوابع في العملية التعليمية يُسهم في إبراز التراث الثقافي الجزائري، ويُعزز نهجًا تربويًا سياقيًا، شاملاً ومتعدد التخصصات.

كلمات مفتاحية: الطوابع البريدية؛ السيميائية البصرية؛ التحليل الخطابي؛ البُعد الثقافي؛ التربية اللغوية.

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1. INTRODUCTION

In the Algerian educational landscape, the teaching of mathematics is often perceived as an abstract discipline, distant from the cultural and linguistic realities of learners. This cognitive and affective gap can lead to disengagement, or even rejection, particularly among students from backgrounds where symbolic and scientific representations are not highly valued. In light of this observation, it becomes essential to rethink teaching methods by integrating materials that foster cultural anchoring, visual mediation, and linguistic interaction.

This article therefore proposes to examine how postage stamps can be mobilized as semiotic and discursive tools in the teaching of mathematics. Through a cross-disciplinary approach combining visual semiotics, discourse analysis, and subject didactics, we will demonstrate that these objects stimulate learner engagement, facilitate the understanding of mathematical concepts, and support the development of essential linguistic skills.

The objective is twofold: first, to analyze the pedagogical potential of stamps from an interdisciplinary perspective; second, to propose concrete pathways for their contextualized integration into teaching practices. By highlighting the connections between image, language, and knowledge, this study adopts an innovative approach aimed at making mathematics more accessible, more embodied, and more closely aligned with the cultural realities of Algerian learners.

Postage stamps, as semiotic objects rich in meaning, represent an original and underutilized pedagogical resource. Bearing historical, scientific, artistic, and identity-related representations, they can be employed as vectors of learning within an interdisciplinary framework. In particular, their potential in mathematics education deserves exploration: certain Algerian stamps celebrate scientific figures, geometric concepts, or events linked to the history of science, thereby offering a visual and cultural entry point into mathematical knowledge.

To this end, we have drawn upon a corpus of Algerian stamps issued between 1962 and 2024, related to science and mathematics, as well as classroom observations. The analysis is

structured around three axes: the semiotics of stamps, discursive practices in the classroom, and the cultural dimension of learning. By mobilizing insights from discursive semiotics (Fontanille, 2021) and language didactics, we aim to demonstrate that stamps can become powerful tools for making mathematics more accessible, more embodied, and more motivating for Algerian students.

1. Stamps as Semiotic Objects

Postage stamps, although originating from administrative and postal use, constitute complex semiotic objects. They condense multiple layers of meaning through visual, textual, and symbolic elements. From a semiotic perspective, they may be analyzed as signs in the Peircean sense combining a perceptible form (the image) with an *interpretive content* (cultural, historical, or scientific meaning).

1.1 Definition and Typology of Stamps

A stamp is a small graphic medium, generally printed on paper, used to pay postage. Beyond its utilitarian function, however, it also serves as a vehicle of national communication. States employ stamps to disseminate identity-related messages, commemorate events, valorize historical figures, or promote knowledge. In Algeria, since independence, philatelic issues have frequently highlighted themes related to science, history, culture, and education.

Several types of stamps can be distinguished according to their content:

- Commemorative stamps (historical events, scientific anniversaries)

- Thematic stamps (mathematics, astronomy, architecture)
- Illustrative stamps (scientific figures, technical objects)

1.2 Semiotic Function: Icon, Index, Symbol

According to Peirce's typology, stamps may function as :

- Icons: when they visually represent an object or figure (e.g., the portrait of a mathematician)
- Indices: when they refer to a historical or geographical context (e.g., a map of Algeria with mathematical formulas)
- Symbols: when they employ abstract or conventional signs (e.g., numbers, equations, geometric symbols)

This semiotic plurality enables multi-level interpretation, encouraging classroom discussion. Students can thus mobilize their visual, linguistic, and cultural competencies to decode the meaning of the stamp.

Stamps and Mathematics: Algerian Examples .1.3

Algeria has issued several stamps related to mathematics, including :

- stamp commemorating the centenary of Mohamed 1984 The Bencheneb, an Algerian intellectual who contributed to the dissemination of scientific knowledge.
- stamp dedicated to science education, depicting 2001 The (mathematical symbols (π , $\sqrt{\quad}$, equations.
- stamp illustrating geometry instruments (compass, 2012 The ruler, protractor) within the framework of promoting education.

These stamps provide a visual entry point into abstract mathematical concepts. Their analysis makes it possible to contextualize knowledge, link it to national history, and stimulate students' curiosity.

2. Discursive and Linguistic Approach

The teaching of mathematics is not limited to the transmission of abstract knowledge; it also mobilizes essential linguistic competencies that enable learners to understand, explain, argue, and interpret. In this perspective, stamps can serve as powerful discursive triggers, fostering diverse linguistic practices around contextualized mathematical content.

2.1 Classroom Discourse Around Stamps

The introduction of a stamp into a mathematics classroom can generate a wide variety of discourses: description of the image, interpretation of its content, connections with mathematical concepts, or even historical narration. Such discursive practices allow learners to appropriate knowledge through language, drawing on their cultural memory and expressive capacity.

For instance, a stamp depicting a geometric figure may serve as the starting point for a discussion on the properties of that figure, its use in Algerian architecture, or its symbolism in Islamic art. Discourse thus becomes a tool of mediation between the visual and the abstract, between the cultural and the scientific.

2.2 Linguistic Practices: Description, Narration, Argumentation

Three types of linguistic practices can be mobilized around stamps:

- Description: learners describe the visual elements of the stamp (shapes, colors, symbols), thereby enriching their vocabulary and lexical precision.
- Narration: they recount the history associated with the stamp (the biography of a scholar, the historical context), which strengthens their ability to structure coherent discourse.
- Argumentation: they debate the importance of the theme represented, the relevance of the stamp as a pedagogical tool, or the connections between culture and science.

These practices foster a linguistic approach to mathematics, reinforcing comprehension, memorization, and the ability to verbalize knowledge.

2.3 The Role of Language in the Appropriation of Mathematical Knowledge

Language plays a central role in the learning of mathematics. It enables the naming of objects, the formulation of hypotheses, the justification of reasoning, and the communication of results. By integrating stamps as discursive supports, learners are offered the opportunity to connect words with images, concepts with contexts, and knowledge with lived experiences.

This approach resonates with the work of Vygotsky who emphasized the importance of language as a tool of thought and cognitive mediation. It also aligns with the principles of language didactics, which hold that all disciplinary learning requires mastery of the discourses specific to the (2007), discipline (Reuter.

Thus, stamps are not merely visual objects: they become triggers for speech, supports for writing, and catalysts for mathematical reflection.

3. Cultural and Identity Dimension

The teaching of mathematics is often perceived as universal and neutral, detached from cultural contexts. Yet, several studies in didactics demonstrate that cultural anchoring plays a fundamental role in motivation, comprehension, and the (2001), D'Ambrosio (2008), appropriation of knowledge (Barton In the Algerian context, marked by historical richness and identity diversity, stamps can serve as powerful vectors of cultural valorization and symbolic recognition.

3.1 Stamps as Vectors of Memory and Heritage

Algerian stamps issued since independence reflect the major stages of national construction: historical figures, significant events, scientific achievements, and artistic traditions. By introducing these objects into the classroom, learners are given the opportunity to reconnect with their history, to discover lesser-known Algerian scholars, and to understand that mathematics is not foreign to their culture

stamp dedicated to Ibn Hamza 1986 For example, the al-Maghribi, a sixteenth-century mathematician, provides a

means of addressing Arab contributions to algebra and trigonometry. Such material fosters a pedagogy of recognition, enabling students to situate themselves within a scientific history that resonates with their own identity.

3.2 Valorization of Algerian Scientific History

The history of science in Algeria is often absent from school textbooks, which tend to privilege Western figures. Yet, numerous Algerian scholars contributed to the development of mathematics, astronomy, and geometry. Stamps can serve as entry points for rehabilitating these figures, such as Mohamed Bencheneb, Cheikh Bouamrane, or the scholars of Tlemcen and Béjaïa.

This valorization helps to deconstruct the notion that mathematics is an imported body of knowledge, demonstrating instead that it was practiced, developed, and taught in the Arab and Berber worlds long before colonization. It thus contributes to the decolonization of knowledge and the revalorization of local scientific heritage.

3.3 Impact on Learners' Motivation and Engagement

The integration of cultural materials into mathematics teaching can positively influence learner motivation. By seeing themselves represented in the content, students develop a sense of belonging and interest. Stamps, through their aesthetic qualities, symbolism, and connection to national history, can spark curiosity, emotion, and a desire to learn

Moreover, activities centered on stamps diversify pedagogical approaches: group work, documentary research, oral

expression, and creative writing. They create a space for interdisciplinarity where mathematics engages in dialogue with history, geography, art, and language.

Thus, stamps are not merely objects of study: they become levers of engagement, identity supports, and tools of cultural mediation in the teaching of mathematics.

4. Case Study in a School Context

In order to assess the pedagogical relevance of stamps as semiotic and discursive mediators in the teaching of mathematics, a field study was conducted in two schools in the wilaya of Blida: the CEM Bordj el Émir Abdelkader of Ain Romana and a middle-level class at the private school BAYA academic year. The study aimed to observe 2025/2024 during the the reactions of students and teachers to the integration of stamps into mathematics learning sequences, and to analyze the effects on engagement, comprehension, and linguistic practices. The objective was to propose a contextualized approach, grounded in familiar cultural objects, to enrich the teaching of mathematics and foster inclusive pedagogy.

4.1 Methodology

a) Fieldwork and Participants

The study was carried out in two third-year middle school classes (equivalent to lower secondary), comprising a The selected schools .14 to 13 students aged 56 total of represented contrasting socio-economic profiles: one located in an urban area, the other in a semi-rural periphery. This diversity made it possible to observe the effects of the approach in differentiated school contexts. The participating teachers, both

experienced, were informed of the research objectives and collaborated actively in the implementation of the sessions.

b) Stamp Corpus

Algerian stamps issued 12 The corpus consisted of selected for their visual, cultural, and ,2024 and 1980 between scientific relevance. Among them;

- The stamp representing Ibn Hamza al-Maghribi and his 1986 work on equations
- The stamp illustrating mathematical symbols (π , $\sqrt{\quad}$, 2001 .(equations
- The stamp depicting geometry instruments 2012
- The stamp dedicated to science education in Algeria 1998
- The stamp celebrating the scholars of the Béjaïa school 2015

These stamps were presented to students in the form of .enlarged posters, accompanied by simplified explanatory sheets

c) Analytical Tools

The analysis relied on methodological triangulation:

- Direct classroom observations (note-taking, audio recordings).
- Questionnaires administered to students before and after the sessions.
- Semi-structured interviews with teachers.

-)2021(A semiotic analysis grid inspired by Fontanille combined with a linguistic approach to classroom discourse following Reuter (2007).

The data were coded and analyzed according to thematic categories: engagement, comprehension, linguistic expression, and cultural appropriation.

4.2 Structure of the Sessions

The sessions were organized around three pedagogical phases:

- 1. Observation Phase:** students discovered the stamps and described what they saw. This stage mobilized visual perception, descriptive vocabulary, and cultural memory.
- 2. Interpretation Phase:** students connected visual elements to mathematical, historical, or scientific concepts. They formulated hypotheses, asked questions, and engaged in group discussions.
- 3. Production Phase:** students wrote a short explanatory or narrative text about the stamp, drawing on the concepts addressed. Some groups also proposed the creation of fictitious stamps illustrating mathematical concepts.

minutes, spread 90 Each session lasted approximately over two consecutive days. The teachers integrated the activities into their annual progression, in connection with chapters on geometry, equations, and measurement.

4.3 Results and Analysis

a) Student Engagement

The questionnaires revealed a significant increase in of students %35 :interest in mathematics after the sessions more curious,” and“ %42 ”,reported feeling “more motivated expressed a desire to “conduct research on Algerian %18 scholars.” Students appreciated the connection between mathematics and their culture, and voiced the wish to learn about other national scientific figures.

Classroom observations showed active participation, particularly among students who were usually reserved. The visual aspect of the stamps facilitated entry into abstract concepts, and discussions were spontaneous, rich, and often interdisciplinary.

b) Development of Linguistic Competencies

Written productions demonstrated improvement in discourse structuring, the use of mathematical vocabulary, and the ability to argue. Students employed expressions such as “this symbol represents,” “this scholar discovered,” and “this stamp shows that...,” reflecting a discursive appropriation of knowledge.

Teachers noted progress in the quality of oral exchanges, with better articulation of ideas and greater lexical precision. The analysis of student texts revealed a diversity of registers: descriptive, explanatory, narrative, and at times poetic.

c) Cultural Appropriation

The integration of stamps enabled students to reconnect with their scientific heritage. Many discovered for the first time figures such as Ibn Hamza or the scholars of Béjaïa. This discovery fostered a sense of pride and belonging, strengthening self-esteem and interest in science.

In the semi-rural school, students spontaneously referred to elements of their local environment (mosques, geometric motifs, artisanal traditions) in connection with the mathematical forms represented on the stamps. This contextualization enriched classroom exchanges and allowed for the valorization of vernacular knowledge.

d) Teacher Perceptions

Teachers emphasized the positive effect of stamps on classroom dynamics, oral participation, and student creativity. They also noted that stamps allowed mathematics to be approached from a more human, accessible, and motivating perspective.

One teacher remarked:

Students saw mathematics differently. They understood “that it is not just numbers, but also a history, a culture, a way of thinking”.

Teachers expressed the desire to integrate more cultural materials into their practice, while highlighting the need for training and adapted resources.

4.4 Limitations of the Study

The study remains exploratory and limited to two distinct schools. It does not allow for generalization of the results to the entire Algerian educational system. Furthermore, the integration of stamps requires prior teacher training in semiotic analysis and interdisciplinarity.

Material constraints were also noted: lack of visual resources, absence of textbooks incorporating stamps, and difficulty in printing large-format materials. These obstacles may hinder the dissemination of the approach.

Finally, the analysis of written productions remains qualitative and would benefit from being deepened through more refined linguistic tools (lexicometric analysis, typology of discourses, etc.).

Research Perspectives .4.5

This study opens several avenues for future research:

- Extending the experimentation to other educational levels (primary, secondary).
- Comparing the effects of the approach in different regions of the country.
- Analyzing teachers' perceptions of the use of cultural objects in the classroom.
- Exploring the impact of this mediation on students experiencing difficulties or at risk of dropping out.

Collaboration between researchers in didactics, linguists, historians of science, and teachers could help build a solid theoretical framework and develop transferable pedagogical tools.

5.Conclusion

The teaching of mathematics in the Algerian context can benefit from a renewed approach grounded in semiotic and discursive mediation. Stamps, as visual objects carrying cultural, historical, and scientific meaning, offer a valuable opportunity to reconnect students with their heritage while simultaneously developing their linguistic and cognitive skills.

The analysis presented in this article has shown that stamps can assume multiple roles in mathematics learning: as triggers of interest, supports for interpretation, vectors of narration, and tools for contextualization. Their semiotic richness allows for multilayered readings that mobilize image, language, and knowledge simultaneously. In the classroom, they foster learner engagement, stimulate curiosity, and strengthen the ability to verbalize abstract concepts.

The field study confirmed these contributions, while also highlighting the necessity of appropriate pedagogical support. The integration of stamps into teaching sequences requires teacher training in visual analysis, interdisciplinarity, and language didactics. It also calls for the creation of specific, accessible, and contextualized resources.

Ultimately, this approach opens new perspectives for an inclusive pedagogy, attentive to students' cultural identities and linguistic practices. It invites us to reconceptualize mathematics

not as a universal and disembodied body of knowledge, but as a living discipline rooted in history, culture, and language. By mobilizing stamps as mediating tools, mathematics can become a space of dialogue, recognition, and creativity.

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