RESEARCH ARTICLE   **WWW.PEGEGOG.NET**

Investigating Alienation from Mathematics in Algeria's Educational System : A Case Study

Dr. Abdelkader Hiaddihine

University Center Morsli Abdellah of Tipaza , Algeria
Email: hiaddihine.abdelkader@univ-tipaza.dz , https://orcid.org/0009-0003-2899-5468

Abstract :

This article examines the phenomenon of Disengagement from Mathematics within the Algerian educational context, considering it a complex educational and psychological issue in which cognitive, emotional, social, cultural, and identity-related dimensions intersect. The study seeks to answer the following fundamental questions : What is alienation in the mathematics classroom and what are its components ? What factors generate it in the Algerian school system ? What are its effects on academic achievement and mathematical identity ? And what approaches can be adopted to address it ? The research adopts a descriptive, analytical, and critical methodology, based on a systematic review of recent academic literature in mathematics didactics, educational psychology, and the sciences of education. The study concludes that alienation from Mathematics in Algeria is a structural phenomenon with deep roots linked to educational policies, to the representations held by teachers and learners, and to the gap between academic knowledge and lived experience. The research also formulates a set of didactic recommendations grounded in contemporary learning theories.

Research Area: Education Sciences / Mathematics Didactics / Educational Psychology

Keywords: Alienation from Mathematics, Mathematics Didactics, Academic Achievement, Mathematical Identity, Algerian School, Mathematics Anxiety, Motivation.

1 Introduction

Mathematics is widely regarded as one of the school subjects that generates the highest levels of anxiety among students in the Algerian educational system. It is often characterized as "difficult", "abstract", or "disconnected from reality". In the context of ongoing transformations in modern education and the predominance of a technicist orientation in curricula, mathematics is increasingly presented as a collection of abstract formal structures and rigid

algorithmic procedures, detached from everyday life and human experience. Under these conditions, students frequently encounter a discipline that feels foreign both to their sense of self and to their world. They struggle to perceive mathematics as an extension of their existential inquiry or as connected to their genuine interests. Such experiences can lead to profound cognitive and emotional disengagement, commonly referred to as Alienation from Mathematics.

This context gives rise to a fundamental dual question: is mathematics inherently alienating, by virtue of its abstract and universal nature, distancing itself from sensory experience and emotional engagement? Or is this alienation the outcome of pedagogical practices and curricular designs that fail to link mathematical concepts to learners' lived realities? Beyond this, could a recontextualization of mathematics within humanistic, philosophical, and aesthetic frameworks transform it from a site of alienation into a domain that promotes intellectual freedom and the expansion of existential awareness?

Answering these questions requires a radical reconsideration of the relationship between mathematical knowledge and the learning subject, as well as a reassessment of the true aims of mathematics education, situated between the formation of a critical mind and the development of the fully realized human being.

This article distinguishes between general school alienation and alienation from a specific subject, arguing that the latter constitutes an independent analytical level that deserves separate study. A student may feel a sense of belonging to the school institution and maintain positive relationships with teachers and with certain subjects, while simultaneously experiencing profound alienation toward another subject.

Alienation from a school subject is defined as a state of identity-based, emotional, cognitive, and purposive disconnection between the student and the knowledge presented by a particular discipline, such that the student finds in this knowledge neither a resonance with their identity, nor a reflection of their existence, nor any meaningful relevance within the context of their life (Stinson, 2008).

In this sense, alienation from a school subject differs from the concept of amotivation (Deci & Ryan, 1985), which may either contribute to alienation or result from it, but does not fully coincide with it. It also differs from learning difficulties, which are primarily cognitive and neurological phenomena, and it goes beyond the notion of dislike for a subject, which may be temporary and linked to circumstantial factors.

In a study by Fatima Zahra Zarrouk (2011), a consensus was identified regarding the intervention of three main groups of factors in the phenomenon of aversion toward mathematics. The first concerns factors related to the student, including their perceptions and pre-existing negative beliefs about their ability to perform in mathematics, as well as their inability to connect the importance of mathematics as a

scientific discipline with its relevance in everyday life. The second concerns factors related to the nature of mathematics itself, particularly its perceived difficulty and its reliance on a certain level of abstraction and depth of analysis. The third relates to the methods used in teaching the subject. This finding directly illustrates, within the Algerian field context, three of the components of math alienation identified by Walls (2009): meaninglessness (the absence of links to everyday life), mathematical helplessness (the belief in one's inability to succeed), and objectification (teaching based on abstraction without contextualization).

This characterization can be traced back to Seeman (1959), who conceptualized alienation through five major dimensions: powerlessness, meaninglessness, isolation, objectification, and self-estrangement. Subsequently, the concept of alienation gradually expanded to encompass the entire field of education. In the specific context of mathematics education, alienation has become a central concept for explaining phenomena such as systematic dislike of the subject, declining motivation, weakened mathematical identity, and low achievement despite the intensity of instruction (Walls, 2009; Boaler, 2015).

In Algeria, the successive waves of educational reforms since 2003—from the first generation of curricula to the current second generation—provide a fertile framework for examining this phenomenon. The Algerian educational system reflects multiple tensions: between the legacy of the classical French academic tradition and the modern discourse of competency-based education; between viewing mathematical knowledge as an end in itself and as a tool for social application; and between the discourse of inclusiveness and equity and the reality of sharp disparities in academic achievement.

The central problem of this study is therefore formulated in the following question: How does mathe anxiety emerge among Algerian learners, what structural and environmental factors nourish it, and how can it be overcome from a didactic perspective?

2 Conceptual and Theoretical Framework

2.1 The Concept of Alienation: From Philosophy to Education

The concept of alienation originally belongs to German social philosophy. Its philosophical foundations were laid by Hegel, who described it as a state in which consciousness becomes separated from its object. The concept was later adopted by Marx (1844) to diagnose the condition of the worker who is separated from both the product of his labor and his productive powers under capitalism. However, the educational trajectory of the concept took an independent direction after Seeman (1959) integrated it into an empirical sociological framework.

In the educational context, school alienation is generally defined as "a state of psychological and social disconnection of the learner from the

educational environment, manifested in the feeling that the school and what it offers have no meaning or value in the learner's life, and that the learner is unable to control or change their educational trajectory" (Hascher & Hadjar, 2018, p. 171). This definition overlaps with the concept of social and emotional disengagement from the school institution identified by Finn (1989).

2.2 Mathematics Alienation: Conceptualization and Principal Elements

In both Anglophone and Francophone literature, alienation from mathematics refers to a cluster of deeply negative attitudes, exclusionary representations, and painful emotional experiences that shape individuals' relationships with mathematics, often resulting in psychological and identity-related disengagement from the discipline. Frances Walls (2009) outlines five key components of mathematics alienation :

(1) Mathematical powerlessness :

This refers to the learner's feeling that they have little or no control over their progress in mathematics and are unable to influence their results in the subject, leading to the belief that they cannot fulfill the expected academic demands. A telling example illustrates this experience: a student once explained, through a peer, that when he entered a mathematics classroom before the start of the lesson, he found the entire board covered with symbols, equations, and formulas. The overwhelming sight of this notation gave him a headache, causing him to leave the classroom—and ultimately the school—without returning.

(2) Meaninglessness:

This dimension concerns the learner's difficulty in perceiving the significance of mathematical knowledge or its relevance to everyday life. As a consequence, the learning process loses meaning, and routine academic activities appear devoid of purpose. Such perceptions are reflected in patterns of disengagement, including repeated failure to complete tasks and homework, indifference toward assignments, a limited sense of benefit from the knowledge acquired, a rapid decline in interest soon after the start of the school year, and the belief that attending mathematics classes constitutes little more than a waste of time.

(3) Social isolation:

This dimension reflects the learner's perception of social exclusion within the mathematics classroom, characterized by a sense of not belonging and being undervalued in the community of mathematics learners. As noted by Majed Harb (2015), indicators of such social isolation include frequent absenteeism, lack of enjoyment during lessons, avoidance of the classroom, anxiety toward mathematics instruction, limited peer interaction, and reduced participation in learning activities.

(4) Objectification:

The treatment of mathematics as a set of rigid procedures and algorithms, stripped of understanding or creative

engagement. This approach is often reinforced by teaching practices that separate mathematics from the learner's identity as well as from their cultural and social context.

(5) Identity alienation:

A deeply rooted belief that mathematics "is not for me" and that it belongs only to certain groups—typically the gifted or exceptional—while being perceived as a kind of innate endowment not accessible to everyone.

Mathematcs alienation is closely related to several neighboring concepts, including mathematics anxiety (Ashcraft & Kirk, 2001), negative mathematical identity (Martin, 2000), attribution of failure to fixed external factors (Weiner, 1985), and the theory of multiple intelligences when misapplied (Gardner, 1983/2011).

1.3 The Specificity of Alienation from Mathematics: Why Mathematics in Particular?

Among all school subjects, mathematics occupies a unique position within the structure of school alienation due to a set of structural characteristics that distinguish it from other disciplines:

(1) Mathematics as the subject of absolute social judgment:

In the Algerian collective consciousness, mathematics is not merely used to measure knowledge; it is used to measure intelligence itself. A student who excels in mathematics is judged to be "intelligent," whereas one who struggles with it is labeled "weak" or "ungifted." This categorical judgment makes alienation from mathematics an alienation not merely from a school subject but from one's perceived human competence itself.

(2) Mathematics as a gatekeeping subject:

It determines who enters the scientific track and who is relegated to the literary track, who gains access to prestigious universities and who is directed toward other fields—often within the humanities, social sciences, and literary studies. This selective function gives alienation from mathematics an existential dimension that extends beyond the classroom and into the learner's professional future.

(3) Mathematics as a subject of dual language:

It is taught in Arabic with the presence of Latin symbols during the early stages, and then suddenly shifts to French at the university level. Students thus find themselves compelled to learn a difficult subject in an even more difficult language.

(4) Mathematics as a subject that claims neutrality:

It presents itself as purely objective knowledge with no culture, history, or identity. Yet this very claim of neutrality is precisely what makes students' alienation from mathematics a silent alienation—one that finds neither a name nor an explanation.

2.3 Explanatory Didactic Theories

The Theory of Didactical Situations proposed by Brousseau (1997) provides one of the richest

interpretive frameworks for understanding mathematics alienation in its didactic dimensions. The concept of the didactic contract diagnoses the way in which the relationship between teacher, learner, and knowledge can shift from a constructive relationship to a dominating one that suppresses learner agency and produces alienation. When the learner expects the teacher to simply "provide" the answer rather than constructing knowledge independently through effort and attempts at problem solving, this blind dependency produces passivity and a sense of powerlessness that deepens with repeated instructional practices. This phenomenon is frequently observed among teachers who rely on rote instruction and what is often described as "banking education," where the focus is placed on the quantity of knowledge delivered and on completing the official curriculum within the prescribed time, rather than on whether learners have truly acquired and internalized mathematical concepts.

Similarly, Self-Determination Theory (Deci & Ryan, 1985, 2000) offers a rich psychological framework for understanding mathematical alienation. According to this theory, intrinsic motivation—and thus emotional engagement with mathematics—develops through the satisfaction of three fundamental psychological needs: competence, autonomy, and relatedness. Any failure to satisfy these three needs within mathematics classrooms accelerates identity disengagement and generates alienation.

Furthermore, Vergnaud's Conceptual Field Theory (1990) provides a precise cognitive perspective. From this viewpoint, alienation emerges when mathematics is presented to learners in isolation from the practical and real-life domains of application (situations) that activate their cognitive schemes—borrowing terminology from Piaget and Bruner. Mathematical knowledge stripped of its contexts is not constructed but merely memorized; and what is memorized without understanding eventually fades away and produces a sense of helplessness.

3 Mathematics Education in Algeria — Structure and Issues

3.1 The Algerian Educational System: A Contextual Overview

Algeria possesses one of the largest educational systems on the African continent, with more than 11 million students enrolled in general education (National Office of Statistics, 2023). The system has undergone successive major reforms, beginning in the post-independence period, followed by the 2003 reforms based on the competency-based approach, and more recently the second-generation curricula (2016), which are theoretically grounded in problem-based learning and active learning.

Mathematics occupies a central position within this system. It is one of the decisive subjects in school orientation and selection, and its high weighting in the Baccalaureate examination serves as a key gateway to elite academic tracks (Mathematics,

Technical Mathematics, and Experimental Sciences). This selective weight transforms mathematics from a simple school subject into a social "gateway," thereby intensifying pressure on learners and negatively affecting their emotional relationship with the subject. Parents themselves often exert significant pressure on their children to choose scientific streams, and many students comply with this orientation even when it does not correspond to their own interests.

3.2 Indicators of Mathematics Alienation in the Algerian Context

Available quantitative and qualitative indicators reveal pronounced dimensions of mathematics-related alienation in Algerian schools. In a study conducted by Ben Ziane and colleagues (2020) on a sample of 620 middle school students in several central Algerian provinces, 67.3% of respondents reported that they "hate mathematics," while 73.1% stated that they "do not understand the relationship between mathematics and their daily lives"—a clear indicator of the dimension of meaninglessness.

Similarly, the findings of Fatima Zahra Zarrouk (2011) revealed a consensus on the influence of multiple factors. These include student-related factors, such as prior negative perceptions and beliefs about their ability to succeed in mathematics, as well as their difficulty in linking the scientific significance of mathematics to its practical applications in everyday life. Other factors stem from the nature of mathematics itself, particularly its perceived complexity and its

dependence on a certain level of abstraction and analytical depth. Finally, the study also highlighted the role of the instructional methods used in teaching the subject.

In a study by Mohamed Qaradi (2023), which applied a scale measuring learning difficulties, the results indicated the presence of academic learning difficulties, behavioral learning difficulties, and academic difficulties in mathematics among middle school students. The study recommended strengthening the connection between mathematical topics and learners' real-life experiences in order to reduce the perception of dryness in mathematical content. This could be achieved through the use of practical examples drawn from students' environments and daily lives and through increasing the number of illustrative examples.

Furthermore, according to Yekhlef Intissar (2025), common errors in mathematics stem from both internal and instructional factors. Internal factors include weak comprehension and reliance on memorization rather than understanding, while instructional factors include the use of traditional teaching methods that lack interaction, as well as insufficient use of visual and technological tools in presenting mathematical concepts.

At the level of international achievement, although Algeria does not participate in the recent cycles of international assessments such as PISA, its results in the TIMSS assessments of 1999 and 2003—when the country participated—were below the international average. These results

align with findings from Algerian studies (Soula, 2003; Amimour, 2023; Ben Ziane, 2020), which identified structural gaps in the learning of mathematics, particularly regarding difficulties and misconceptions among both teachers and learners. Such conditions have produced educational practices that reinforce negative attitudes toward the subject. Reports from the National Office of Examinations and Competitions also indicate that the failure rate in mathematics in the Middle School Certificate examination exceeded 40% in certain years between 2015 and 2022.

Qualitative studies further show that students describe mathematics classes with telling expressions such as "dictation without understanding," "we memorize formulas without knowing why," and "the teacher explains only to those who understand quickly." These descriptions directly point to the dimensions of objectification, social isolation, and powerlessness that together form the triangle of mathematical alienation.

3.3 Factors Producing Alienation in the Algerian Educational Context

A. Factors Related to Curricula and Textbooks:

International literature indicates that textbooks in most educational systems, including Arab countries, are dominated by repetitive drill exercises at the expense of problems embedded in authentic life contexts connected to the learner's real-life experiences and daily routines (Verschaffel et al., 2000; Palm, 2008; Vos, 2018). This imbalance reinforces the mental image of mathematics as an abstract activity disconnected from the student's reality and devoid of meaning for them.

B. Factors Related to Teaching Practices:

Algerian classrooms are dominated by a transmissive pedagogy, prioritizing lectures and presentation over inquiry and participatory knowledge construction, despite the official discourse of educational reform. Mathematics lessons are largely teacher-centered, leaving very few opportunities for discussions among students. This unequal distribution undermines autonomy and reinforces feelings of helplessness. A study by Bobkri Ramissa, which examined the pedagogical competence of secondary school mathematics teachers, found that teachers "do not possess sufficient pedagogical knowledge" and that the teacher's approach directly influences students' attitudes toward the subject, with a lack of opportunities for discussion and dialogue and a dominance of the teacher as the sole "source of knowledge" for students.

C. Factors Related to Teachers' Representations:

Research by Lerman (2001) and subsequent studies show that teachers' beliefs about the nature of mathematics—whether it is a fixed procedural system or a historically productive human activity—directly influence their teaching practices and the perceptions students form. Some teachers view mathematics as a "science

of talent" rather than a "science for everyone," a belief that reinforces implicit discrimination and deepens identity-based alienation among students who are not deemed "gifted."

D. Social and Sociocultural Factors:

Social and cultural factors form a deep layer of mathematical alienation. Mathematics is associated in the collective consciousness with a specific social elite (children from educated, urban families), a connection that produces what Bourdieu (1984) calls "symbolic violence." Many students—especially from working-class and remote areas—experience an early sense that mathematics "is not for them."

Gender research adds another dimension: despite progress in female schooling in Algeria, Khellil & Ould Hamou (2021) show that Algerian girls exhibit higher levels of mathematics anxiety compared to boys, partly due to prevailing stereotypes in family and social environments about the "nature" of subjects suitable for women.

E. Identity-Related Factors:

Ladson-Billings (1995) posed a fundamental question: why do intelligent students fail in schools that claim to be competent? Her answer was that failure lies not in the students or their intelligence, but in schools that require them to abandon themselves in order to learn.

The corresponding question in the Algerian context is: why do many Algerian students fail in mathematics despite strong parental interest, financial investment in support lessons, and clear innate ability? The answer provided by this theory is that mathematics is taught in Algeria as if it were imported from outside history, culture, and religion, as though the Algerian student must "leave their identity at the classroom door" before sitting at their desk.

4 Implications of Mathematical Alienation

4.1 On Academic Achievement and Educational Trajectory:

Scientific literature consistently highlights a strong causal relationship between feeling of alienation toward mathematics and declining academic achievement. Hembree's (1990) comprehensive meta-analysis of 151 studies revealed that mathematics anxiety is strongly and negatively correlated with achievement, pushing learners to avoid and even reject the subject entirely. On a cognitive level, Ashcraft & Kirk (2001) demonstrated that this anxiety depletes working memory resources when confronting mathematical problems, impeding performance even when the learner possesses the necessary knowledge, thereby widening the gap between actual competence and observable performance.

This relationship persists over time, forming an escalating feedback loop. Longitudinal research by Ma & Xu (2004) shows that early academic underachievement generates increasing anxiety, which hinders future performance, thereby reinforcing and deepening failure from one stage to the

next. Carey et al. (2016) further argue that this relationship is inherently bidirectional and reciprocal, meaning that interventions targeting either side—whether by enhancing achievement or reducing anxiety—are necessary to break this cycle and rebuild the learner's connection with mathematics.

This state of alienation leads to what Middleton & Spanias (1999) describe as the "spiral of escalating failure": experiences of mathematical failure generate more anxiety, anxiety leads to further avoidance, avoidance reinforces cognitive gaps, and these gaps in turn produce additional failures, ultimately culminating in a sense of complete incapacity.

4.2 On Mathematical Identity and Self-Concept:

Chronic mathematics alienation gives rise to what Martin (2000) terms a Negative Mathematical Identity—a set of entrenched beliefs about oneself in relation to mathematics, including statements such as "I am weak in mathematics," "I will never succeed in it," and "Mathematics is not for people like me." Research shows that this identity extends its effects to the learner's broader self-concept, influencing career aspirations and the selection of future university study paths.

4.3 On National Outcomes:

Within the knowledge-based economy that Algeria aims to transition toward under its 2030 vision, the alienation of students from mathematics represents a structural threat to national competitiveness. A shortage of scientific, technical, and mathematical competencies limits progress toward a digital and green economy. Comparative reports, such as those from Morocco's Higher Council for Education, Training, and Scientific Research (2019), highlight similar patterns, indicating that this is a relevant and generalizable concern for the Algerian context.

5 Proposed Approaches to Overcoming Mathematical Alienation

5.1 At the Didactic and Curriculum Level:

Problem-Based Learning (PBL), rooted in Freudenthal's (1973) work on Realistic Mathematics Education, provides effective pathways to address mathematical alienation. This approach begins with "authentic situations" inspired by learners' real-life contexts and connected to their cultural environment, restoring the functional meaning of mathematics and shifting learners from passivity to agency. Benali & Khezzar (2020) advocate adapting this approach to the Algerian context.

Similarly, Situated Learning Theory (Lave & Wenger, 1991) offers strong justification for integrating mathematics learning into meaningful activity contexts—such as projects, simulations, or real-life problems—transforming the mathematics classroom from a site of knowledge transmission into a Community of Practice.

5.2 At the Level of Teaching Practice:

Research on Open Mathematics by Boaler (2002, 2015) shows that shifting from traditional, teacher-centered classrooms to collaborative inquiry-based classrooms produces a radical transformation in learners' emotional relationship with mathematics. She recommends three key modifications to teaching practice:

(a) providing open-ended problems,

(b) encouraging errors as learning tools rather than as failures,

(c) connecting mathematical activities to the learner's identity, local culture, and national context.

Specifically in the Algerian context, Abdelkrim Gharib (2022) recommends using the Negotiation Didactic strategy, which removes the authoritarian aspect of the didactic contract and rebuilds the teacher-learner-knowledge relationship in a participatory, shared-responsibility pedagogical spirit.

5.3 At the Level of Teacher Training:

According to Ball et al. (2008), effective mathematics teaching requires specialized content knowledge that encompasses not only mastery of mathematics but also the ability to use multiple representations, understand common student misconceptions, and create productive learning situations. In Algeria, Mokrani notes that Écoles Normales Supérieures teacher training programs devote only around 12% of their curriculum to pedagogy and mathematics didactics, a shortfall that contributes to the alienation observed in classrooms.

5.4 At the Level of Educational Policy:

Tackling mathematics alienation at a systemic level requires reimagining the role of mathematics beyond a tool for social selection, toward a model rooted in inclusivity and equity. Gutiérrez (2013) proposed the "Equity in Mathematics" framework, emphasizing that alienation among marginalized groups stems not from individual deficits but from structural and policy-driven factors. The framework advocates for comprehensive reforms in resource allocation, teacher education, and the design of assessments and examinations.

6 Conclusion and Recommendations

This study emphasizes that mathematics alienation in the Algerian context is neither a marginal phenomenon nor an inevitable fate, but rather a historical, social, and pedagogical construct that can be deconstructed and overcome. The analysis revealed that the phenomenon is rooted in three intertwined levels: curricula abstracted from real-life contexts, teacher-centered instructional practices based on obedience rather than knowledge construction, and the broader cultural and social system that transforms mathematics into a class-based privilege.

Alienation from mathematics in Algeria is not a mere methodological problem solvable by adding extra

lessons or improving explanations. It is a deep identity crisis that challenges the most fundamental questions in education: *Am I concerned with this knowledge? Do I belong to it? Does it belong to me?*

The Algerian student, whose identity is composed of Islam, Arabism, Amazigh heritage, and local belonging, currently experiences mathematics as a domain that integrates none of these elements (or only superficially). This implicit exclusion makes the learner feel that mathematics is "not for me," whereas historically, the truth is the exact opposite: the mathematics studied today carries, deep within its structure, the imprints of its ancestors.

The task facing the Algerian educational system is not simply to make mathematics easier, but to reconnect it with its rightful heirs—telling the Algerian Muslim-Arab-Amazigh student: *This knowledge is yours, and you are its owner; your mathematics exists within your language, history, faith, environment, and rituals—enter it from where you are.* From this point, genuine learning begins.

To address this phenomenon, the researcher proposes a set of **integrated practical measures based on established academic evidence**:

1. **Rewriting the history of mathematics**: Revise the Algerian mathematics textbooks to fairly highlight Arab-Islamic contributions as foundational rather than decorative. For example, instead of merely mentioning "Al-Khwarizmi" in a line, the entire chapter on algebra should be framed around the idea: *"This science was produced by a scholar from our civilization and given to the world."* This historical grounding restores learners' sense of belonging and cultural pride.

2. **Connecting mathematics with Islamic jurisprudence**: Integrate applications of Islamic law in the curriculum not as religious instruction, but as authentic mathematical content—e.g., inheritance problems in fractions, zakat calculations in percentages, determining the qibla in trigonometry, or crescent sighting in astronomical statistics. These applications preserve mathematical rigor while providing a meaningful purpose and enduring spiritual motivation for the learner.

3. **Building a Muslim mathematical self-image**: Present learners with role models who combine faith and mathematical expertise, not only through textbooks but also via documentaries and meetings with Algerian Muslim scientists and engineers, showing how they harmonize faith and mathematics in their lives. Seeing relatable figures in the mathematical world helps dismantle deep-seated alienation.

4. **Problems rooted in Algerian reality**: Conduct a comprehensive review of mathematics curricula to ensure that at least 40% of problems relate to learners' actual life contexts, inspired by Realistic Mathematics Education (Freudenthal, 1973; Van den Heuvel-Panhuizen, 2003). Examples include local markets, traditional construction, Algerian agriculture, community statistics, and Amazigh and

Arab handicrafts. A student solving a problem about the distribution of an olive harvest or the area of a kasbah house engages with mathematics that directly concerns them.

5. **Transforming errors from punishment into learning tools**: Foster a classroom culture where mistakes are recognized as natural stages in the thinking process, and effort and experimentation are valued before correct answers. This cultural shift is essential for breaking cycles of anxiety and emotional alienation.

6. **Reforming teacher training programs**: Increase the proportion of pedagogical and didactic content, and train teachers to diagnose early indicators of mathematical alienation. Teachers play a critical role in shaping students' perceptions and attitudes toward mathematics, and their classroom practices directly influence learners' relationships with the subject.

7. **Integrating technology and artificial intelligence in mathematics education**: Tools such as programming languages (e.g., R) can renew traditional teaching methods, stimulate active learning, and foster innovation. Programming allows teachers to present mathematical concepts in creative and engaging ways, enhancing student achievement and expanding their learning horizons (Amin Amimour, 2023).

8. **Developing reliable, localized diagnostic tools**: Adapt and validate instruments to measure mathematics alienation in Algeria, informed by established tools such as the MARS scale for mathematics anxiety (Richardson & Suinn, 1972) or the School Alienation Questionnaire (Hascher & Hadjar, 2018).

9. **Investing in participatory field research (Action Research)**: Collaborate between universities and schools to develop educational experiences that reduce the gap between academic knowledge and learners' lived experience.

10. **Liberating mathematics from its selective, exclusionary role**: Rebuild mathematics as a discipline for critical thinking and problem-solving, accessible to all learners.

At its core, mathematics—anchored in a rich civilizational heritage—is a human endeavor, not the monopoly of an intellectual elite. Restoring this human dimension within Algerian mathematics education enables learners to experience the subject meaningfully and take pleasure in engaging with it, rather than feeling alienated or overwhelmed.

7 References and Sources

1. Amimour, Amin, (2023). *Using Programming in Mathematics Education*. Al-Ta'leemiyya Journal, Vol. 2, Issue 2, National Institute for Educational Research, Algeria, pp. 659–687.

2. Ashcraft, M. H., & Kirk, E. P. (2001). *The relationships among working memory, math anxiety, and performance*. Journal of Experimental Psychology: General, 130(2), 224–237. https://doi.org/10.1037/0096-3445.130.2.224

3. Ball, D. L., Thames, M. H., & Phelps, G. (2008). *Content Knowledge for Teaching: What Makes It Special?*

Journal of Teacher Education, 59(5), 389–407. https://doi.org/10.1177/0022487108324554

4. Ben Zian, Naima, & Massoudi, Abbas (2020). *Psychological Alienation and Its Relationship with Academic Motivation among Middle School Students*. Journal of Humanities and Social Sciences, University of Oum El Bouaghi, Issue 40, pp. 213–231. https://www.researchgate.net/publication/384606069_alaghtrab_alnfsy_wlaqth_baldafyt_llanjaz_ldy_talbat_klyt_altqnyat_alshyt_waltbyt_-_bghdad

5. Boaler, J. (2002). *Experiencing School Mathematics: Traditional and Reform Approaches*. Lawrence Erlbaum Associates, Mahwah, NJ.

6. Boaler, J. (2015). *Mathematical Mindsets*. Jossey-Bass.

7. Boubekri, Romaisa (2021). *Pedagogical Competence of Secondary School Mathematics Teachers and Its Relation to Second-Year Secondary Students' Attitudes*. Master's Thesis, Kasdi Merbah University, Ouargla. https://dspace.univ-ouargla.dz/jspui/bitstream/123456789/26093/1/boubekri-romaissa_compressed%20(1).pdf

8. Bouam, Lilia (2017). *Misconceptions of Mathematical Concepts among a Sample of Fifth-Grade Students: Nature, Causes, Detection, and Correction*. Journal of Studies on Algeria and the World, Issue 7, Part 2. https://asjp.cerist.dz/en/article/63178

9. Bourdieu, P. (1984). *Homo Academicus*. Paris: Éditions de Minuit.

10. Brousseau, G. (1997). *Theory of Didactical Situations in Mathematics*. Kluwer Academic Publishers.

11. Carey, E., Hill, F., Devine, A., & Szücs, D. (2016). *The chicken or the egg? The direction of the relationship between mathematics anxiety and mathematics performance*. Frontiers in Psychology, 6, 1987. https://doi.org/10.3389/fpsyg.2015.01987

12. Deci, E. L., & Ryan, R. M. (1985). *Intrinsic Motivation and Self-Determination in Human Behavior*. Plenum.

13. Deci, E. L., & Ryan, R. M. (2000). *The "What" and "Why" of Goal Pursuits*. Psychological Inquiry, 11(4), 227–268.

14. Finn, J. D. (1989). *Withdrawing from School*. Review of Educational Research, 59(2), 117–142.

15. Freudenthal, H. (1973). *Mathematics as an Educational Task*. Reidel.

16. Gardner, H. (2011). *Frames of Mind: The Theory of Multiple Intelligences* (3rd ed.). Basic Books.

17. Gutiérrez, R. (2013). *The Sociopolitical Turn in Mathematics Education*. Journal for Research in Mathematics Education, 44(1), 37–68.

18. Harb, Majid (2015). *Critical Education: Hopes of Peoples and Fears of Politicians*. Dar Kunooz Al-Ma'rifa for Publishing and Distribution, Amman, Jordan.

19. Hascher, T., & Hadjar, A. (2018). *School Alienation*. Educational Research, 60(2), 171–188.

20. Hembree, R. (1990). *The nature, effects, and relief of mathematics*

anxiety. Journal for Research in Mathematics Education, 21(1), 33–46.

21. Ladson-Billings, G. (1995). *Toward a theory of culturally relevant pedagogy*. American Educational Research Journal, 32(3), 465–491.

22. Lave, J., & Wenger, E. (1991). *Situated Learning: Legitimate Peripheral Participation*. Cambridge University Press.

23. Lerman, S. (2001). *Cultural, Discursive Psychology*. Educational Studies in Mathematics, 46(1–3), 87–113.

24. Ma, X., & Xu, J. (2004). *The causal ordering of mathematics anxiety and mathematics achievement: A longitudinal panel analysis*. Journal of Adolescence, 27(2), 165–179.

25. Martin, D. B. (2000). *Mathematics Success and Failure among African-American Youth*. Lawrence Erlbaum Associates.

26. Marx, K. (1844/1993). *Economic and Philosophic Manuscripts of 1844*. International Publishers.

27. Middleton, J. A., & Spanias, P. A. (1999). *Motivation for Achievement in Mathematics: Findings, Generalizations, and Criticisms*. Journal for Research in Mathematics Education, 30(1), 65–88.

28. National Office of Statistics (2023). *Education Statistics in Algeria for the 2022–2023 Academic Year*. Algiers: National Office of Statistics.

29. Palm, T. (2008). *Impact of authenticity on sense making in word problem solving*. Educational Studies in Mathematics, 67(1), 37–58.

30. Qaradi, Mohamed (2023). *Learning Difficulties in Mathematics among Middle School Students: A Field Study*. Rafouf Journal, University of Adrar, Vol. 11, Issue 1. https://asjp.cerist.dz/en/article/212921

31. Richardson, F. C., & Suinn, R. M. (1972). *The Mathematics Anxiety Rating Scale: Psychometric Data*. Journal of Counseling Psychology, 19(6), 551–554.

32. Seeman, M. (1959). *On the Meaning of Alienation*. American Sociological Review, 24(6), 783–791.

33. Vergnaud, G. (1990). *La théorie des champs conceptuels*. Recherches en Didactique des Mathématiques, 10(2–3), 133–170.

34. Verschaffel, L., De Corte, E., & Lasure, S. (1994). *Realistic considerations in mathematical modelling of school arithmetic word problems*. Learning and Instruction, 4(4), 273–294.

35. Walls, F. (2009). *Mathematical Subjects: Children Talk About Their Mathematics Lives*. Springer.

36. Weiner, B. (1985). *An Attributional Theory of Achievement Motivation and Emotion*. Psychological Review, 92(4), 548–573.

37. Yekhlef, Intissar (2025). *Common Mistakes in Mathematics: A Field Study of Second-Year Middle School Students*. Al-Shamel Journal of Educational and Social Sciences, Vol. 8, Issue 2, pp. 38–48. https://asjp.cerist.dz/en/article/287040

38. Zarrouk, Fatima Zahra (2011). *A Study of Some Factors of Aversion to Mathematics among Middle and Secondary School Students: A Field Study in Blida*. Journal of Social Sciences, University of Laghouat. https://www.asjp.cerist.dz/en/article/137934