

Research Article

A Delphi Approach to Dyscalculia: Looking for Consensus on Problems and Solutions

Estefanía Espina^{*ID}, José M. Marbán^{ID}, Ana Maroto^{ID}

Department of Didactics of Experimental Sciences, Social Sciences and Mathematics, Faculty of Education and Social Work, University of Valladolid, Valladolid, Spain
E-mail: estefania.espina@uva.es

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Abstract: Although the prevalence associated with dyscalculia in the school population is estimated to be between 5% and 7%, this disorder is considered underdiagnosed, leading to an insufficient educational response. In light of this situation, the aim of this research was to identify the main problems currently faced by students with dyscalculia and the people who are part of their environment, as well as to seek consensus about possible solutions that can contribute to improving their relationship with mathematics learning. To this end, a qualitative approach was adopted, using the Delphi method by consulting a group of 19 experts belonging to six sectors connected to students with dyscalculia (families, teachers, psychopedagogical teams, associations, teacher trainers and educational administrations). The method was carried out in a two-round process through the application of two questionnaires structured around three dimensions: knowledge and experience of dyscalculia, identification of problems, and proposed solutions. The results indicate that, on one hand, students with dyscalculia in Spain are currently at a disadvantage, mainly due to widespread lack of awareness about this disorder among those involved in their education. On the other hand, improving this situation requires both training processes and awareness-raising actions.

Keywords: dyscalculia, Delphi method, learning difficulties, mathematics learning, school population

1. Introduction

In every school environment, it is common to find students with some type of learning difficulty that interferes with both their academic progress and some of their daily life activities, such as reading, writing, or mathematics. Focusing specifically on mathematics, and more precisely on dyscalculia, this learning disorder has received much less attention compared to other disorders such as dyslexia or Attention Deficit Hyperactivity Disorder (ADHD) (Espina et al., 2022), despite having an estimated prevalence of between 5% and 7% of the school population (Geary, 2011).

In the Spanish context in which this research was carried out, dyscalculia is underdiagnosed, and as a result, the educational response is often insufficient or inappropriate for students with this disorder (Torres, 2021). There is also widespread lack of awareness about dyscalculia among both teachers and families, along with misconceptions that can hinder proper support for these students (Espina, 2024).

Given this scenario, it is convenient to explore the current situation of students with dyscalculia to find out the barriers they face in their learning of mathematics and to move towards practices that can improve their relationship

with mathematics and, consequently, their quality of life. Therefore, the main objective of this research is to identify the main problems currently faced by students with dyscalculia and the people who are part of their environment, while at the same time seeking consensus about possible solutions.

Despite the growing interest in understanding learning difficulties in mathematics, no research has been found that specifically and thoroughly addresses the objective proposed in this study. The existing literature tends to focus on general aspects of the diagnosis and characteristics of dyscalculia or on specific educational interventions, and it is less common to find contributions that offer a comprehensive view of the current problems faced by students with dyscalculia and their immediate environment. This shortcoming highlights the need for research such as this one aimed at providing a comprehensive, collective, and contextualized understanding of the phenomenon.

2. Theoretical framework

Students may manifest different mathematics learning difficulties throughout their schooling that hinder their full access to adequate mathematical literacy. The concept of mathematics learning difficulties is generally applied to students whose mathematical performance is below the average for their group, or their own average performance (Fernández-Baroja et al., 1991). Mathematics learning difficulties can be classified according to their severity: mild, moderate, and severe (American Psychiatric Association, 2022). Students with dyscalculia are in the most severe group.

Currently, there is no widely accepted definition of dyscalculia. Over time, research in the fields of Psychology, Neurology, and Education, among others, has added and modified characteristics based on advances in the field (Espina, 2024). In this research, no particular definition of dyscalculia is adopted, but rather a combination of the most common characteristics is taken as a reference. Thus, we consider dyscalculia is a learning disorder that persistently affects the acquisition of mathematical skills (Castaldi et al., 2020; Torresi, 2018), particularly those related to number sense, counting, and calculation (Meier et al., 2021). It is a disorder that significantly influences both children's academic performance and everyday tasks related to mathematics (Alay et al., 2020). It occurs in students with normal intelligence and appropriate schooling (Ribeiro et al., 2017), and is heterogeneous in nature, as there is great variability within and between individuals (Kaufmann et al., 2013). It can present comorbidly with other learning disorders or difficulties (dyslexia, ADHD, language disorder, etc.) (Emerson, 2015).

Dyscalculia has a multifactorial origin, as it may be caused by neurobiological, genetic, and environmental factors (Kaufmann & von Aster, 2012). Its neurological origin shows that different deficits in mathematical skills are produced by persistent alterations in various brain areas (Butterworth et al., 2011) and by structural differences in the volume of grey and white matter (McCaskey et al., 2020). Regarding its genetic and environmental origins, it is known that dyscalculia tends to be a hereditary disorder and may be due to conditions such as premature birth or alcohol consumption during pregnancy (Gallego, 2015).

3. Methodology

To achieve the research objective, the study was developed under a qualitative approach where the Delphi method was implemented for the collection of information, with the purpose of exploring, describing and gaining an in-depth understanding of the complexity and diversity of experiences and knowledge surrounding dyscalculia from the perspective of those who, in one way or another, have an authoritative voice on this subject.

The Delphi method, in the words of Reguant-Álvarez and Torrado-Fonseca (2016), 'consists of a technique for obtaining information, based on the consultation of experts in an area, in order to obtain the most reliable consensus opinion of the group consulted' (p. 88). This technique involves two types of participants: the facilitator and the experts or panelists. The researcher acts as the facilitator, responsible for selecting the experts who will form the Delphi group and for designing the questionnaire that they must complete (Grisham, 2009).

The method requires experts to respond individually to the questions and send their answers to the facilitator. The facilitator processes the contributions and provides feedback to the experts, asking them to submit their opinions again. This process can be carried out in several rounds until the facilitator considers that consensus has been reached. Experts

remain anonymous to each other, but not to the researcher (Okoli & Pawlowski, 2004; Zartha-Sossa et al., 2019).

This study followed the phases proposed by Reguant-Álvarez and Torrado-Fonseca (2016) for applying the Delphi method. Figure 1 presents a diagram outlining the steps taken to complete the process.

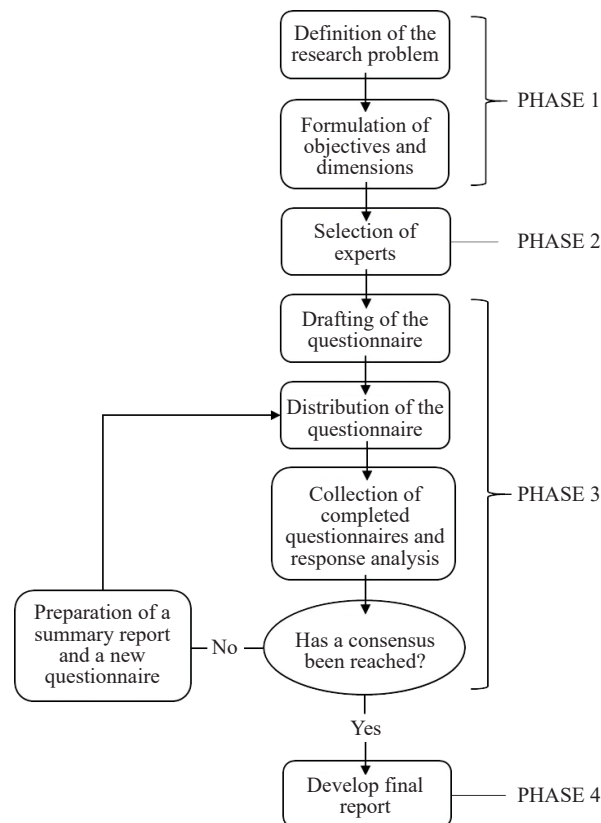


Figure 1. Diagram of the Delphi method application process
Source: Created by the authors

The careful selection process for the expert group was conducted using the Knowledge Resource Nomination Worksheet (KRNW) (Okoli & Pawlowski, 2004). Finally, the group of experts consisted of 19 participants who met the requirement of being in direct or indirect contact with students with dyscalculia or at identified risk of developing dyscalculia. Six different sectors were represented in the group. Table 1 shows a summary of the profile of the experts sorted by sector.

The consultation process was conducted online by means of questionnaires combining open questions with questions that required experts to rank a sort of options. For the first, consensus was determined by contrasting content analysis of the answers developed independently by the three researchers that author this paper. Concerning the second type of questions, consensus was quantified using Randolph's free-marginal multirater kappa (Randolph, 2005). The number of rounds to be conducted was a priori defined as the minimum number to guarantee results sufficiently clear, reiterative, and stable in the case of the open questions. This choice aligns with the principle of data saturation, commonly acknowledged in qualitative research (Saunders et al., 2018). Given the exploratory nature of the study, the time required for the experts to complete the process, and the risk that they would abandon or lose interest if subjected to a high number of rounds, a consensus endorsed by Kappa values greater than 0.40 was considered acceptable for the ranking questions. This led to the conduction of only 2 rounds, each of them using their own questionnaire (both available in the Appendix). The first questionnaire was designed based on scientific literature related to the research topic and aligned with the study's objective. It was structured into three dimensions: (1) Knowledge, relationship, and experience with dyscalculia; (2) Identification of problems; (3) Proposal of solutions. The second questionnaire was

developed from the responses to the second and third dimensions of the first round. It focused on those issues where consensus or a high level of agreement had not been reached, and these were revisited to deepen the discussion on the solutions proposed by all experts.

Table 1. Delphi method expert profiles

Sector	Expert	Profile
Teaching	Expert 1	Primary School teacher with a background in mathematics education and learning difficulties.
	Expert 2	Early Childhood Education teacher with training in learning difficulties.
	Expert 3	Mathematics and Economics teacher in Secondary Education with training in dyscalculia and learning difficulties.
Families	Expert 4	Mother of a girl with dyscalculia and dyslexia, trained in Universal Design for Learning and learning difficulties and board member of an association for dyslexia and other specific learning difficulties.
	Expert 5	Mother of a girl with dyscalculia, dyslexia and dysorthography and social worker for a dyslexia and other specific learning difficulties association and a diabetes association.
	Expert 6	Father of a girl with dyscalculia and member of an association for dyslexia and other specific learning difficulties.
	Expert 7	Mother of a boy with dyscalculia, dyslexia, Attention Deficit Hyperactivity Disorder (ADHD) and dysgraphia and teacher with extensive training and experience with mathematical learning difficulties, dyscalculia, manipulative mathematics and software for the development of mathematical thinking and the acquisition of mathematical skills.
Association	Expert 8	Board member of a dyslexia and other specific learning difficulties association and mother of a boy with dyslexia.
	Expert 9	Board member of a dyslexia and other specific learning difficulties association and mother of a girl with dyscalculia and dyslexia.
	Expert 10	Board member of a dyslexia and other specific learning difficulties association. Early Childhood and Primary Education teacher, Specialist in specific learning difficulties, Specialist in school coexistence and family-school integration and Master's Degree in learning difficulties and language disorders.
Teacher trainers	Expert 11	Associate Professor in the area of Didactics of Mathematics and member of a research group whose main line of research is the specific educational support needs in mathematics of students with autism.
	Expert 12	Associate Professor in the area of Didactics of Mathematics and member of a research group in Didactics of Mathematics with research lines related to special educational needs and mathematics learning difficulties.
	Expert 13	Associate Professor in the area of Didactics of Mathematics. Her research interests are mainly mathematics education in autistic students and the study of mathematical aspects in textbooks.
	Expert 14	Associate Professor in the area of Didactics of Mathematics. Her research interests are mainly the affective domain in the teaching-learning of mathematics and mathematics learning difficulties.
Educational institution	Expert 15	Evaluation technician in a public administration with competences in education and linked to innovation and teacher training processes.
	Expert 16	Member of an Educational and Multiprofessional Guidance Team for Educational Equity in a public administration with competence in educational matters.
Psychopedagogy	Expert 17	Psychopedagogue in a private cabinet, teacher at various educational levels (Early Childhood, Primary and Secondary Education and University), researcher and director of several pedagogical innovation projects.
	Expert 18	School Counselor and Welfare and Protection Coordinator.
	Expert 19	School Psychopedagogue.

Source: Created by the authors

4. Results

This section presents the grouped results from the two rounds of the Delphi method, showing only those on which a high level of consensus was reached.

4.1 *First dimension results*

Most of the experts reported having had direct experiences with dyscalculia, except for teacher trainers and those working in public educational administrations (Questions 2 and 3). Their experiences are closely related to their respective sectors: teaching (classroom contact), families (daily life), associations (contact with students and their families), and Psychopedagogy (contact in schools or psychopedagogical centers).

The group of teachers highlighted the difficulty of identifying dyscalculia in the classroom without prior knowledge of the disorder, as well as the slow progress of students with mathematical difficulties compared to their peers, despite the great effort made by both students and teachers. Families noted that their experience with their children has changed their perspective, and taught them that students with dyscalculia need a different way of learning mathematics. Experts working in associations emphasized several aspects of their consultations with families and children. They observed high levels of anxiety related to math tasks, stress, and frustration in most children with dyscalculia, and noted the daily challenges they face. They also warned of the lack of knowledge and research on dyscalculia compared to other learning difficulties or disorders such as dyslexia. They mentioned that while the education system often discusses illiteracy, it rarely addresses “innumeracy”. They pointed out that it is socially acceptable to be “bad at math” because it has always been considered a difficult subject, and this belief can mask difficulties stemming from neurobiological disorders. Additionally, this group noted that their years of experience in associations have shown that mathematical re-education is more feasible in primary education than in secondary education, where intervention becomes more complex. Finally, psychopedagogists underlined the wide variety of mathematical learning difficulties observed among students with dyscalculia-not just compared to others, but also among themselves.

Regarding training in dyscalculia (Question 4), about half of the experts (10 out of 19) reported having received some form of training on the disorder. The most common types of training included conferences, workshops or seminars, talks, and self-directed learning. Overall, the training was viewed positively, although some experts noted that it did not help much with aspects directly related to intervention.

4.2 *Second dimension results*

Most responses indicate that the main problems faced by students with dyscalculia are as follows (Questions 5a and 8):

- Diversity and a large number of difficulties in learning mathematics. Experts noted a lack of deep understanding of the foundations of mathematical learning and listed a wide range of difficulties.
- Severe difficulties in learning mathematics both in academic settings and daily life. At school, students often perform poorly in mathematics and in subjects that use math as a tool. In daily life, their difficulties with math significantly hinder their ability to manage everyday situations requiring basic arithmetic.
- Lack of knowledge and lack of training on dyscalculia among families, teachers, psychopedagogists, or the general population, where a large part of the members of these groups have never heard of this disorder.
- Late or non-existent diagnosis of dyscalculia. Experts believe that the needs and strengths of students are not detected and, consequently, dyscalculia is not properly treated, and the educational response is not in accordance with the needs or is very slow. It is common to hear phrases like “they’re just bad at math” or “bad with numbers”, without investigating further. Often, difficulties are attributed to reading comprehension or memory issues associated with dyslexia. Some students progress through school without truly understanding or integrating key concepts.
- Mathematics in the classroom is highly abstract from an early age.
- Affective problems experienced by students with dyscalculia due to their math difficulties (distress, anxiety, stress, frustration, low self-esteem, etc.).
- Dyscalculia is masked by the assumption that mathematics is difficult for students.

Regarding the main problems faced by teachers (Questions 5b and 9), most responses center on their lack of

knowledge and training about dyscalculia, as well as the resulting difficulty in identifying and addressing it in the classroom. Some experts from the family and psychopedagogical sectors noted that teachers often feel lost, and may attribute students' difficulties to a lack of interest, effort, or motivation, using terms such as "lazy, sluggish, or clumsy". One teacher in the Delphi panel emphasized: "It's very difficult and frustrating to teach and not see learning happen when you're doing everything you can". The same problems identified among teachers were also found among families (Questions 5c and 10): lack of knowledge and training on dyscalculia, and difficulty identifying and supporting their children at home. When families face all the difficulties that dyscalculia brings at home, they don't know who to turn to and sometimes think that their child doesn't want to make the effort to concentrate, leading to the same negative comments mentioned above. In addition, experts agree that the continuous attempts by family members to help their children without success generate frustration, despair, exhaustion, or helplessness. They often have a very hard time seeing their children with low self-esteem, low expectations for their mathematical progress, and a lot of anxiety if they do not receive an adequate educational response.

All responses also pointed to a lack of knowledge and training on dyscalculia among professionals in the psychopedagogical field (Questions 5d and 11). Specifically, one of the psychopedagogists indicates that they have a significant lack of knowledge both in relation to the detection of dyscalculia and in how to provide guidance to teachers. One of the experts from the teaching group emphasizes that, after asking the guidance and psychopedagogical team at her school, they tend to focus mainly on difficulties with reading and writing, and do not normally carry out any tests related to dyscalculia. Additionally, teacher trainers highlighted a possible lack of knowledge about intervention strategies within the field of mathematics education itself.

Finally, the main problem faced by public educational administrations is the lack of knowledge and awareness about dyscalculia (Questions 5e and 12). Some of the experts have pointed out that they perceive little concern for this disorder on their part, a very biased view of reality, and a lack of awareness and interest. One of the presidents of the learning difficulties associations points out that: "All education laws talk about the importance of early detection and intervention in Specific Learning Difficulties (SLD), and that educational administrations will provide resources for this. But in reality, there are no unified, evidence-based protocols". Finally, some experts also agree that the exclusion of SLDs from Ministry of Education scholarships is a sign that educational administrations are unaware of the support these students need. Some experts also indicated that the exclusion of SLDs from Ministry of Education scholarships reflects a lack of understanding of the support these students need.

4.3 Third dimension results

The possible solutions proposed for the problems are very similar for all the groups that participated, so first, the similarities will be presented together, and then some results will be highlighted individually (Question 6).

There is a clear consensus among all experts on how to solve the problems identified: training and awareness-raising on dyscalculia for all those involved in helping and (re)educating students with dyscalculia (families, teachers, psychopedagogical teams, educational administrations, etc.). Training is considered essential for early identification and diagnosis of dyscalculia, and for providing personalized support to these students. To ensure that these students receive appropriate support, it is proposed that there be communication among all the people and institutions involved mentioned above, the design of detection and intervention protocols, individualized treatment of each case, and an increase in human, material, methodological, and economic resources, among other actions. In the case of financial resources, one family member points out that "it would be very helpful if students with dyscalculia were eligible for scholarships aimed at funding re-education therapies".

For students with dyscalculia, it is considered essential to learn mathematics (and for teachers to teach it) through the use of approaches based on manipulative mathematics, working with mathematics in context, applying mathematics to everyday life, and teaching mathematics based on prior knowledge and experience, as well as personalized attention through adaptations that consider their characteristics. Among the adaptations mentioned by experts are the following: allowing students to use multiplication tables, reducing the number of mathematical operations to be performed in assessment tests, allowing a guide sheet for solving math problems or showing the mathematical formulas they may need, agreeing with the student on the possibility of having more time to take exams, and proposing sequenced exams with adapted math problems (with only one question to solve and enough space to do so). It also highlights the importance of students with dyscalculia becoming aware of the problem with the help of specialists (counselors

or psychopedagogists) and learning how to minimize the effects or barriers of the disorder, i.e., how to deal with it, communicating how they feel, what helps them, and what does not, etc.

The solution related to teacher training proposes greater attention to learning difficulties in initial and continuing teacher training. Experts comment on the importance of informing teachers about the manifestations of dyscalculia, the different resources, guidelines, and adaptations that can be implemented in the classroom, or ways to adapt math exams, among other proposals.

In the case of families, experts emphasize that training should focus on providing advice on how to adequately support their children in dealing with the situation at home, as well as offering strategies, and resources for addressing dyscalculia within the family environment. In addition, they indicate the need for greater contact and communication with educational centers, and the possibility of accessing financial aid to fund re-education therapies.

For psychopedagogists and counselors, in addition to training, they emphasize the importance of having good standardized tools for diagnosing dyscalculia and knowledge of the most appropriate adaptations for treating these students.

Finally, the solutions given by public educational administrations are diverse. On the one hand, they propose reorganizing the attention given to educational needs in schools by providing and investing in more human resources, and facilities that allow personalized attention. They highlight the need to take specific learning difficulties into account when designing protocols. On the other hand, they mention the importance of basing education laws on scientific knowledge of what works in education, increasing collaboration between universities and the administration, and prioritizing student well-being.

The second round of the Delphi method delved deeper into what content or characteristics the training on dyscalculia should have for the groups involved. The responses of most experts on teacher training were largely consistent and focused on two aspects (Question 13): the identification of dyscalculia and the educational response. Table 2 presents a summary of the content and characteristics mentioned by the experts.

Table 2. Proposal on the characteristics of teacher training

Identification of dyscalculia	
Conceptualization of dyscalculia	Symptoms and manifestations in the classroom, both cognitive and affective in nature
Tools and resources for identifying dyscalculia or suspected dyscalculia in the classroom	Prevention of dyscalculia from early childhood education onwards
Educational response	
Guidelines and intervention strategies in the classroom adapted to the needs of students with dyscalculia	Re-education in mathematics teaching supported by scientific evidence
Specific curricular and methodological adaptations	Inclusive methodologies for teaching mathematics
Multisensory and practical materials, tools, strategies, and resources for teaching mathematics at various educational levels	Skills for effective and affective communication and collaborative work with families, the school's Psychopedagogy staff, and students

Source: Created by the authors

With regard to training for families (Question 14), a distinction has been made between training that can be received by all family members, without distinction, and training that can be received by family members who have a case in their home or are interested in learning more about this disorder. For the first type, experts state that training should be aimed at raising awareness among family members about the existence of dyscalculia, offering basic and general training (characteristics of dyscalculia and manifestations in daily life, guidelines on how to act and who to contact if they detect a possible risk of dyscalculia, etc.). For the second type, they propose more specific training. Most experts agree that this training should be aimed at:

- Providing information about the diagnostic and intervention options available.
- Providing accessible material and digital resources for working on math at home, and guidelines for supporting study and work organization.
- Raising awareness of the importance of constant contact and communication with the school (psychopedagogists

and teachers) in order to receive support.

- Providing information about their children's rights to inclusive education and the type of educational support their child can receive at school, and which they can request.

- Provide strategies for emotional education at home and for managing the emotions generated by dyscalculia (frustration, low self-esteem, family stress, etc.), and learn what attitude they can adopt to help their children.

- Offer guidance and support over time.

The experts' responses regarding training for students with dyscalculia focus on two types of training: cognitive and affective (Question 15). In relation to the first, the experts have indicated that students should be aware that they have this disorder and have a basic understanding of what it is. Training should focus on teaching strategies to support mathematics learning, and be adapted to the individual needs of each student. It should be based on contextualizing mathematical situations in everyday environments, and using manipulative materials and technological resources that motivate students. It is important that they know what help and adaptations they should receive in the teaching-learning process and in assessment tests. With regard to affective training, experts emphasize the need for it to focus on self-knowledge and emotional management for students with dyscalculia.

The responses regarding training for psychopedagogists are very similar to those for teachers (Question 16), so much so that some of the experts even point this out and mention the greater depth of the subject matter in the training of psychopedagogists. The additional content that their training should include, compared to that already indicated for teachers, is as follows:

- Tests and instruments for assessing and diagnosing dyscalculia.

- Evidence-based psychopedagogical guidelines and strategies for intervention in dyscalculia.

- Protocols for re-education in older cases.

- Prevention programs.

- Information on aspects of teaching and learning mathematics in general and in students with dyscalculia in particular.

- Skills for collaborative work with families, teachers, and students.

- Guidelines for addressing the emotional problems of students as a result of dyscalculia.

With respect to training aimed at the general population (Question 17), the response has been one of the most unanimous. All experts point out the importance of raising social awareness of dyscalculia, and sensitizing people to this disorder and its impact. They propose that these actions should provide simple and general information about the difficulties that a person with dyscalculia may experience, the implications of this disorder in everyday and professional life, and the great need for support and understanding that currently exists.

Regarding the type of training that experts consider necessary for the different agents, they highlight continuous training through practical workshops and seminars for teachers (Question 18), talks and workshops or seminars for family members and students (Questions 19 and 20), and talks for the general population (Question 22). Finally, in the case of professionals in the field of Psychopedagogy, the experts did not opt for any particular type of training (continuing education, conferences or congresses, workshops, courses, etc.) (Question 21).

When experts were asked to what extent they believe research on dyscalculia needs to continue advancing (Questions 7 and 23), the majority stated that research in this field is essential and highly necessary. They emphasized that it is crucial for improving both the personal and academic lives of students with dyscalculia, and for raising awareness among the various stakeholders involved. They also noted the need for continued progress, agreeing that research on dyscalculia is still in its early stages. Only two of the experts provided information on the lines of research in which they believe further progress should be made. One of them mentioned that progress should be made in basic research in the field of neuroplasticity and in applied research on the exercises, and actions to be carried out for the proper development (with monitoring) of the disorder. As for the other expert, his responses point to strengthening research on the design and analysis of the effectiveness of arithmetic teaching proposals for students with dyscalculia, and on the relationship between the symptoms of dyscalculia (observable errors) and the cognitive and clinical characteristics of students with dyscalculia. In the second round, the lines of research considered by the experts to be the most urgent and a priority to address were, first, the diagnosis of dyscalculia (standardized tests, detection instruments, etc.), followed by the development of protocols or guidelines for the care of students with dyscalculia and the prevention of dyscalculia at an early age.

5. Conclusions, limitations, and future research lines

The results obtained in this research have enabled us to achieve the proposed objective by clearly and thoroughly identifying the main problems faced by students with dyscalculia in their mathematics learning process, as well as the challenges experienced by the people around them. Likewise, possible lines of action aimed at minimizing these problems have been proposed. These results have shown that, currently, students with dyscalculia in Spain are at a disadvantage. In this sense, it has been found that the main and biggest problem causing this situation is the widespread lack of knowledge about dyscalculia among those who are directly and indirectly involved in the lives of these students (teachers, family members, psychopedagogists, and public educational administrations). Firstly, the lack of knowledge about dyscalculia among teachers makes it very difficult for them to identify and address it in the classroom, as also noted in studies by Baccaglini-Frank and Di Martino (2020) and Reeve and Waldecker (2017), among others. Similarly, the lack of knowledge among families also makes it difficult to identify it at home, and the inability to help their children leads to frustration, despair, exhaustion, and helplessness. These effects of dyscalculia on the family environment are also noted in the study by Mutlu (2024).

In addition to this central problem related to the lack of knowledge about dyscalculia in Spain, the experts who participated in the Delphi method identified other issues that are worth highlighting. On the one hand, students with dyscalculia are confronted with highly abstract mathematical activities in the classroom from a very early age, and their difficulties with this subject can cause serious emotional problems (distress, anxiety, stress, frustration, low self-esteem, etc.). On the other hand, there is a lack of awareness of dyscalculia among teachers, who, among other problems, do not have enough time to design interventions that respond to these students’ needs. In turn, this problem is difficult to address, as public educational administrations are trying to cope with a lack of human and material resources to care for students with dyscalculia. With regard to families with children who have or appear to have dyscalculia, experts also emphasize that they have great difficulty in finding the right professional for proper (re)education, and these professionals are faced with a lack of reliable and accessible tools for diagnosing this disorder and a lack of specific intervention protocols.

To improve the current situation of students with dyscalculia, in general, training and awareness-raising about dyscalculia is considered necessary for all those involved in helping and (re)educating these students, a need that has also been identified by various studies focused specifically on dyscalculia, such as those by Han (2025) and Holman (2023), as well as in broader research on developmental disabilities, such as the study by Uria-Olaizola et al. (2025). Teachers and families are demanding training aimed at detecting this disorder and, above all, acting. In addition, other solutions are being considered, such as the need for communication and coordination between the different agents involved in the education of these students, personalized attention, learning mathematics through manipulative methodologies, increasing human, material, methodological, and economic resources, and designing detection and action protocols, among other solutions.

Figure 2 shows a summary of the main findings of this study.

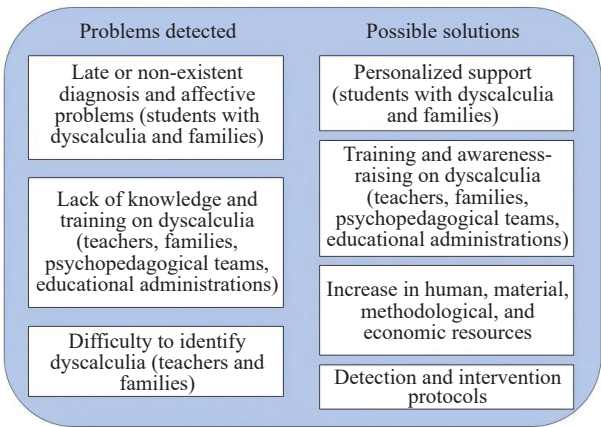


Figure 2. Summary of findings
Source: Created by the authors

It is important to recognize several methodological limitations. Although the findings of this study are considered significant, the data collection technique used is inherently subject to the opinion of a limited group of experts, which may introduce bias and limit the diversity of perspectives considered in the consultation process. However, the number of experts who participated is considered sufficient and representative of the groups that were considered for their selection. The study was conducted within the Spanish educational context, which may limit the applicability of the results to other cultural or educational settings. In addition, the reliance on self-reported data from experts introduces the possibility of response bias, and the Delphi method itself presents challenges in terms of replicability due to its dependence on expert judgment, iterative consensus-building, and contextual factors that may vary across studies (Hasson et al., 2025). Finally, the use of only two rounds with the consensus criteria defined in the methodology section, although sufficient in an exploratory approach, may not robustly reflect agreement among experts.

Among the future lines of research linked to this study is, on the one hand, the design of training courses on dyscalculia adapted to the needs of each of the agents we have mentioned throughout this research. On the other hand, the development of a guide or protocol for caring for students with dyscalculia (or at risk of suffering from it) for dissemination in Spanish educational centers. It is considered important to address the current need for clear intervention protocols so that both parents or guardians and teachers have guidance and direction when living with, raising, teaching, or educating a child who is at risk of having or has been diagnosed with dyscalculia. Additionally, a possible complementary line of work is a second quantitative stage of the methodological process that, within the framework of a mixed sequential approach, allows for a quantitative approximation to find patterns, measure consensus, establish relationships between variables, etc., thereby enriching the findings obtained through the Delphi method.

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Conflict of interest

The authors state that they have no conflicting interests.

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Appendix

A.1 First round questionnaire of the delphi method

Welcome to the first round of the Delphi method in which you are participating. Please answer the following questions as honestly as possible. Remember that your answers will be used exclusively for scientific purposes. Thank you very much for your participation!

Dimension 1: Knowledge, relationship, and experience with dyscalculia

Question 1. In what ways are you connected to the world of dyscalculia? You may select multiple options.

- (a) I am a parent or relative of someone who has dyscalculia.
- (b) I have had or currently have contact with cases of dyscalculia in the classroom.
- (c) I have had or currently have contact with cases of dyscalculia in my professional environment.
- (d) I have received some type of training on this disorder.
- (e) I am interested in the topic and have researched and read about it.
- (f) Other.

Question 2. Please describe any direct experiences you have had with dyscalculia and what those experiences have taught you about dyscalculia.

Question 3. To what extent do you understand this learning disorder (For example, what do you know about its diagnosis, prevalence, manifestations, interventions, etc.)?

Question 4. Have you received any type of training on dyscalculia?

- (a) Yes
- (b) No

If you answered yes, what type of training have you received? You may select multiple options.

- (a) Talk
- (b) Course
- (c) Workshop or seminar
- (d) Conferences or congresses
- (e) Other

How would you evaluate this training? To what extent has it helped you understand this disorder?

Dimension 2: Identification of problems

Question 5. In your opinion, what are the main problems faced by:

- (a) Students with dyscalculia.
- (b) Teachers.
- (c) Families.
- (d) Professionals in the field of Psychopedagogy.
- (e) Public educational administrations.

Dimension 3: Proposal of solutions

Question 6. What possible solutions do you propose for each of the problems you identified in the previous question?

- (a) Students with dyscalculia.
- (b) Teachers.
- (c) Families.
- (d) Professionals in the field of Psychopedagogy.
- (e) Public educational administrations.

Question 7. To what extent do you believe that research on dyscalculia needs to continue advancing?

A.2 Second round questionnaire of the delphi method

Welcome to the second round of the Delphi method in which you are participating. Throughout the questionnaire, the main conclusions reached in the first round will be presented, and new questions will be linked to them. Please answer as sincerely as possible. Remember that your answers will be used exclusively for scientific purposes. Thank you very much for your participation!

Dimension 1: Identification of problems

In the first round, we asked about the different problems perceived around dyscalculia. Multiple issues were identified, demonstrating the complexity of this disorder. Below, we highlight the points with the greatest agreement among participants, while also requesting further input on areas of discrepancy or lack of consensus to enrich the collective analysis and move toward agreement.

As in the first round, the information is divided according to the group being focused on at each moment.

Question 8. Students with dyscalculia

First round responses: Most responses pointed to the following problems: lack of awareness and training on dyscalculia among families, teachers, psychopedagogists, and the general population; late or non-existent diagnosis, which prevents timely educational response; and severe difficulties in learning mathematics both academically and in daily life.

Please rank the following problems from highest to lowest priority, placing the most important issues at the top:

Emotional problems experienced by students with dyscalculia due to their difficulties with mathematics (anxiety, stress, frustration, low self-esteem, etc.).

The breadth of the mathematics curriculum (too extensive and demanding).

Mathematical activity in the classroom is very abstract from an early age.

Dyscalculia is masked by the assumption that mathematics is difficult for students.

Question 9. Teachers

First round responses: Most responses focused on the lack of knowledge and training on dyscalculia and the resulting difficulty in identifying and supporting affected students in the classroom.

Please rank the following problems from highest to lowest priority:

Lack of awareness about dyscalculia.

Lack of personal resources to assist students with dyscalculia.

Increasing classroom diversity that is impossible to address with high student-teacher ratios.

Lack of time to design interventions for students with dyscalculia.

Question 10. Families

First round responses: Many responses identified the same problems as those found among teachers: lack of knowledge and training on dyscalculia and difficulty identifying and supporting their children at home. Additionally, experts agreed that repeated unsuccessful attempts to help their children lead to frustration, despair, emotional exhaustion, and helplessness.

Please rank the following problems from highest to lowest priority:

Difficulty finding the right professional for proper (re)education.

Lack of general awareness and sensitivity about dyscalculia.

Dependence on financial resources to provide extra academic support not available through other means.

Lack of understanding from society in general (it is an invisible issue).

Question 11. Professionals in the field of Psychopedagogy

First round responses: All responses pointed to a lack of knowledge and training on dyscalculia.

Please rank the following problems from highest to lowest priority:

Lack of reliable and accessible diagnostic tools.

Lack of specific intervention protocols.

Lack of time to observe in the classroom and thus make a more accurate diagnosis.

Question 12. Public educational administrations

First round responses: The main issue identified was the lack of knowledge and awareness about dyscalculia.

Please rank the following problems from highest to lowest priority:

Budgetary constraints to implement appropriate measures for students with dyscalculia.

Lack of human and material resources to support students with dyscalculia.

Absence of accurate estimates of dyscalculia prevalence in classrooms.

Lack of research progress to determine student profiles with dyscalculia.

Dimension 2: Proposal of solutions

In the first round, we also asked about possible solutions to the identified problems. Analyzing the responses, there was clear consensus among all participants on the need for training and awareness-raising on dyscalculia for everyone involved in supporting and (re)educating students with dyscalculia (families, teachers, psychopedagogical teams, educational administrations, etc.). Training is considered essential for early identification and diagnosis, and for providing personalized support.

To ensure proper support, the following were proposed: communication among all involved parties and institutions, development of detection and intervention protocols, individualized treatment for each case, and increased allocation of human, material, methodological, and financial resources.

We consider it relevant to delve deeper into the type and characteristics of the training being requested, so please answer the following questions:

Question 13. What content or characteristics should training for teachers include? Briefly describe.

Question 14. What about training for families? Briefly describe.

Question 15. And for students? Briefly describe.

Question 16. And for professionals in the field of Psychopedagogy? Briefly describe.

Question 17. And for the general population? Briefly describe.

Question 18. What type of training do you consider necessary for teachers? Mark all that apply:

- (a) Talks.
- (b) Workshops or seminars.
- (c) Short courses with multiple sessions.
- (d) Long courses with multiple sessions.
- (e) Conferences or congresses.
- (f) Ongoing training through practical workshops.
- (g) Other (please specify).

Question 19. And for families? Mark all that apply:

- (a) Talks.
- (b) Workshops or seminars.
- (c) Short courses with multiple sessions.
- (d) Long courses with multiple sessions.
- (e) Conferences or congresses.
- (f) Ongoing training through practical workshops.
- (g) Other (please specify).

Question 20. And for students? Mark all that apply:

- (a) Talks.
- (b) Workshops or seminars.
- (c) Short courses with multiple sessions.
- (d) Long courses with multiple sessions.
- (e) Conferences or congresses.
- (f) Ongoing training through practical workshops.
- (g) Other (please specify).

Question 21. And for professionals in the field of Psychopedagogy? Mark all that apply:

- (a) Talks.
- (b) Workshops or seminars.
- (c) Short courses with multiple sessions.
- (d) Long courses with multiple sessions.
- (e) Conferences or congresses.
- (f) Ongoing training through practical workshops.

(g) Other (please specify).

Question 22. And for the general population? Mark all that apply:

(a) Talks.

(b) Workshops or seminars.

(c) Short courses with multiple sessions.

(d) Long courses with multiple sessions.

(e) Conferences or congresses.

(f) Ongoing training through practical workshops.

(g) Other (please specify).

Question 23. In which research areas do you believe dyscalculia research should advance as a priority?

Please rank the following research lines from highest to lowest priority, placing the most urgent and important topics at the top:

Origin and etiology of dyscalculia.

Prevalence of dyscalculia.

Diagnosis of dyscalculia (standardized tests, detection tools, etc.).

Development of protocols or guidelines for supporting students with dyscalculia.

Affective profile of students with dyscalculia.

Prevention of dyscalculia at early ages.

Intervention in school, family, and psychopedagogical settings.

Analysis of the effectiveness of math teaching proposals for students with dyscalculia.

Personalized technological resources for the (re)education of students with dyscalculia.

Follow-up and support for adults with dyscalculia.