Elementary Teachers' Perceptions of Dyscalculia in Jordan: Knowledge Gaps, Attitudes, Instructional Confidence, and Perceived Barriers

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Received: 5/3/2026
Accepted: 21/4/2026
Published: 30/6/2026

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DOI:https://doi.org/10.59759/educational.v5i2.1988

Abstract

Dyscalculia, a specific learning disability involving persistent difficulties with numerical concepts and mathematical operations despite adequate intelligence and instruction, affects 5–7% of school-aged children—comparable to dyslexia yet receiving far less attention in research and teacher preparation. This under-recognition is especially concerning in elementary education, where foundational math skills develop, but educator awareness remains limited.

This mixed-methods study examined perceptions of dyscalculia among 150 elementary teachers in Jordan who completed surveys, with 20 participating in semi-structured interviews. Results revealed that 68% had limited or no formal training in dyscalculia, and 52% confused dyscalculia with math anxiety. Although 74% held positive attitudes toward inclusion, only 35% felt confident adapting instruction for students with dyscalculia.

The findings underscore the need for targeted professional development to improve knowledge, self-efficacy, and support. Recommendations include integrating dyscalculia-specific modules into teacher training and creating school-based networks for early identification and equitable math education. This research advances understanding of teacher perceptions' role in learning disability outcomes within the Jordanian context.

Keywords: Dyscalculia, Perceptions, Gaps, Attitudes, Barriers, Elementary Teachers.

تصورات معلمي المرحلة الأساسية حول عسر الحساب في الأردن: فجوات المعرفة، والاتجاهات، والثقة في الكفاءة التدريسية، والمعوقات المتصورة

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ملخص

يُصيب عسر الحساب، وهو صعوبة تعلم محددة تتضمن صعوبات مستمرة في فهم المفاهيم العددية والعمليات الحسابية رغم كفاية الذكاء والتعليم، ما بين 5 و7% من الأطفال في سن المدرسة، وهي نسبة تُقارن بعسر القراءة، إلا أنها لا تحظى بالاهتمام الكافي في البحوث وإعداد المعلمين. ويُثير هذا الإهمال قلقًا بالغًا، لا سيما في التعليم الابتدائي، حيث تتطور المهارات الرياضية الأساسية، بينما يبقى وعي المعلمين محدودًا. واستخدمت هذه الدراسة المنهج المختلط لفحص تصورات عسر الحساب لدى 150 معلمًا ومعلمة في المرحلة الابتدائية في الأردن، ممن أكملوا استبيانات، وشارك 20 منهم في مقابلات شبه منظمة. وكشفت النتائج أن 68% منهم تلقوا تدريبًا رسميًا محدودًا أو معدومًا في مجال عسر الحساب، وأن 52% يخلطون بين عسر الحساب وقلق الرياضيات. ورغم أن 74% منهم أبدوا مواقف إيجابية تجاه الدمج، إلا أن 35% فقط شعروا بالثقة في تكييف أساليب التدريس للطلاب الذين يعانون من عسر الحساب. وتؤكد هذه النتائج على الحاجة إلى برامج تطوير مهني مُوجّهة لتحسين المعرفة والكفاءة الذاتية والدعم. تتضمن التوصيات دمج وحدات تدريبية خاصة بعسر الحساب في برامج إعداد المعلمين، وإنشاء شبكات مدرسية للكشف المبكر عن صعوبات التعلم وضمان تعليم رياضيات عادل. يُسهم هذا البحث في تعزيز فهم دور تصورات المعلمين في نتائج صعوبات التعلم في السياق الأردني.

الكلمات المفتاحيّة :عسر الحساب، التصورات، الفجوات، المواقف، المعوقات، معلمو المرحلة الابتدائية.

Introduction

Dyscalculia is a specific learning disability characterized by persistent and severe difficulties in understanding numerical concepts, manipulating numbers, and performing mathematical operations, despite adequate intelligence, educational opportunities, and the absence of other neurological or sensory impairments (American Psychiatric Association, 2013; Haberstroh & Schulte-Körne, 2019). Classified under the broader category of specific learning disorder with impairment in mathematics in the *DSM-5*, dyscalculia encompasses core challenges including deficits in number sense (the intuitive understanding of quantities and numerical relationships), difficulties memorizing arithmetic facts, inaccuracies in calculation, and problems with mathematical reasoning (American Psychiatric Association, 2013). A particularly prominent core deficit is impaired subitizing—the ability to instantly recognize small quantities without counting—which often manifests early and hinders the development of foundational number sense (Decarli et al., 2023; Dyscalculia Services, n.d.). Additional common symptoms include delayed counting skills, trouble connecting numbers to quantities, difficulties with place value, estimating magnitudes, telling time, understanding fractions, and performing mental arithmetic (Child Mind Institute, 2025; Cleveland Clinic, 2022).

Prevalence estimates for dyscalculia among school-aged children typically range from 3% to 7%, with many recent sources converging on approximately **5-6%** (Haberstroh & Schulte-Körne, 2019; Morsanyi et al., 2018; Shalev, 2007; Springer Nature, 2025). Some studies report slightly higher rates in specific populations, such as around 8.7% of kindergarten children at risk (Ouyang et al., 2024), while others note figures up to 6-10% depending on diagnostic criteria and cut-offs (Dowker, 2024; Kißler, 2025). This prevalence is broadly comparable to that of dyslexia, yet dyscalculia continues to receive far less attention in educational research, policy, and teacher preparation compared to reading-based disabilities (EdWeek, 2023; Pagliaro-Newman, 2024) While global estimates are 5–7%, limited data exist for Jordan and Arab contexts, where similar rates are reported for related learning difficulties.

Despite its relatively common occurrence, awareness and understanding of dyscalculia among educators remain limited, particularly in elementary education where foundational numerical skills are established (Mutlu, 2022; Sousa et al., 2017). Recent international studies, including those from the UK, Italy, Vietnam, and South Africa, reveal significant gaps in educators' knowledge, with many teachers receiving little to no formal training on dyscalculia (Loughborough University, 2026; Roulstone et al., 2026). Common misconceptions persist, such as confusing dyscalculia with general math anxiety, poor instruction, laziness, or simply "being bad at math," rather than recognizing it as a neurodevelopmental difference rooted in core deficits like impaired number sense (Dias et al., 2013; Graves, 2018; Mutlu, 2022; Pagliaro-Newman, 2024). Research consistently shows that many teachers report minimal or no professional development on the topic, leading to under-identification, delayed interventions, and inadequate classroom support (Mutlu, 2022; Roulstone et al., 2026; Sousa et al., 2017). These knowledge gaps are particularly concerning because teachers' perceptions, attitudes, and self-efficacy play a pivotal role in early identification, the implementation of inclusive practices, and students' long-term academic and emotional outcomes—including heightened risks of math anxiety and lower achievement when support is lacking (Graves, 2018; Kizilelma, 2023; Sousa et al., 2017; Yoong, 2022).

The present study addresses this critical gap by examining elementary school teachers' perceptions of dyscalculia in Jordan. Through a mixed-methods design—including a survey of 150 teachers from diverse urban, suburban, and rural districts and semi-structured interviews with 20 participants—the research explores their knowledge of symptoms and interventions, attitudes toward inclusion, instructional confidence, and perceived barriers such as resource limitations and training shortages. In Jordan, where inclusive education is promoted under Ministry of Education policies, teachers' readiness to support students with dyscalculia remains understudied.

To guide this investigation, the following research questions were formulated:

1. What is the level of elementary teachers' knowledge and awareness regarding the definition, symptoms, causes, and evidence-based interventions for dyscalculia?
2. What are elementary teachers' attitudes toward inclusive practices and support for students with dyscalculia in the elementary mathematics classroom?

3. To what extent do elementary teachers feel confident and prepared to adapt instructional practices and curricula for students identified with or at risk for dyscalculia?
4. What barriers and challenges do elementary teachers perceive in identifying, supporting, and teaching students with dyscalculia, including factors related to training, resources, and systemic demands?

Research Problem

The research problem centers on the under-recognition and inadequate support for dyscalculia (a specific learning disability affecting 5–7% of school-aged children) in elementary education, despite its comparable prevalence to dyslexia. In Jordan and similar contexts, elementary teachers often lack sufficient knowledge, formal training, and preparation to identify, understand, and support students with dyscalculia. This leads to misconceptions (e.g., confusing dyscalculia with math anxiety or poor motivation), low instructional confidence, and systemic barriers that hinder early identification, inclusive practices, and equitable math outcomes.

The study specifically examines this gap among 150 elementary teachers (grades K–5) in Jordan, where inclusive education policies exist but teacher readiness remains understudied. It addresses four core issues:

- Limited knowledge/awareness of dyscalculia’s definition, symptoms, causes, and interventions.
- Attitudes toward inclusion of students with dyscalculia in regular math classrooms.
- Low self-efficacy and confidence in adapting instruction.
- Perceived barriers (training shortages, resources, class size, etc.).

Without targeted improvements, students with dyscalculia face delayed interventions, increased math anxiety, and poorer long-term academic/emotional outcomes.

Research Terms and Their Operational Definitions

The study uses the following key terms, operationally defined and measured through the mixed-methods design (survey of 150 teachers + semi-structured interviews with 20 teachers). Definitions draw directly from the instrumentation, results, and theoretical framing:

- **Dyscalculia**: A specific learning disability characterized by persistent and severe difficulties in understanding numerical concepts, manipulating numbers, performing mathematical operations, and developing number sense (including impaired subitizing—the instant recognition of small quantities without counting), despite adequate intelligence, instruction, and absence of other neurological/sensory impairments (American Psychiatric Association, 2013; Haberstroh & Schulte-Körne, 2019). *Operational definition*: Assessed via 15 survey items (True/False/Don't Know) on core symptoms (e.g., deficits in number sense, arithmetic facts, place value), causes, and distinction from other math difficulties; supplemented by interview probes on teachers' descriptions of symptoms.
- **Knowledge and Awareness (including Knowledge Gaps)**: Teachers' familiarity with dyscalculia's definition, symptoms, causes, and evidence-based interventions (e.g., explicit number-sense instruction, multisensory approaches). *Operational definition*: Measured quantitatively by (a) self-reported formal training (limited/no training vs. any training) and (b) 15 survey items on accurate identification of symptoms/causes/interventions. Qualitatively explored through interview questions on understanding of symptoms and misconceptions (e.g., 52% survey endorsement of equating dyscalculia with math anxiety was corroborated by interview narratives).
- **Attitudes Toward Inclusion**: Teachers' beliefs about the feasibility and benefits of including students with dyscalculia in regular elementary mathematics classrooms with appropriate supports. *Operational definition*: Measured by 10 Likert-scale items (1 = Strongly Disagree to 5 = Strongly Agree) on statements such as "Students with dyscalculia can succeed in inclusive classrooms" and "Inclusive practices benefit all students." Higher scores indicate more positive attitudes.
- **Instructional Confidence (and Self-Efficacy)**: Teachers' perceived preparedness and ability to identify early signs of dyscalculia, adapt curricula/instruction, and implement evidence-based strategies for affected

students. *Operational definition*: Assessed via 10 Likert-scale items (adapted from the Teachers' Sense of Efficacy Scale; Tschannen-Moran & Woolfolk Hoy, 2001), with examples such as "I feel confident adapting math lessons for students with dyscalculia." Scores below the midpoint indicated low confidence (only 35% reported high confidence).

- **Perceived Barriers**: Obstacles teachers face in identifying, supporting, and teaching students with dyscalculia. *Operational definition*: Quantified by survey endorsement rates of specific barriers (e.g., lack of training 72%, resource shortages 65%, large class sizes 59%, limited specialist access 54%); qualitatively detailed through interview themes on systemic/practical challenges (especially pronounced in rural settings).
- **Perceptions (overarching term)**: The combined construct encompassing knowledge/awareness, attitudes, instructional confidence, and perceived barriers. *Operational definition*: Captured holistically through the convergent parallel mixed-methods design (survey + interviews), with integration of quantitative and qualitative data for triangulation.
- **Elementary Teachers**: Educators actively teaching mathematics in grades K–5 in Jordan. *Operational definition*: Purposive sample of 150 survey respondents and 20 interviewees, stratified by district type (urban/suburban/rural), experience, and self-reported knowledge levels.

Importance of the Study

This study is significant for several reasons:

1. **Fills a critical research gap in the Jordanian/Arab context**: While dyscalculia receives far less attention globally than dyslexia, almost no prior research has examined elementary teachers' perceptions in Jordan. The findings provide the first mixed-methods evidence of widespread knowledge gaps (68% with limited/no training), misconceptions (52%), low confidence (only 35%), and barriers, despite positive inclusion attitudes (74%).
2. **Highlights implications for policy and practice**: It demonstrates that positive attitudes alone are insufficient without training and resources. The results directly support recommendations for (a) integrating dyscalculia-

specific modules into pre-service teacher education, (b) mandatory in-service professional development, and (c) school-based support networks for early identification—actions that could improve equitable math education under Jordan's inclusive education policies.

3. **Contributes to international literature**: The Jordanian findings align with and extend global studies (e.g., UK/Italy/Vietnam/South Africa surveys showing similar training deficits), while revealing context-specific nuances (e.g., rural-urban differences in resource barriers). This advances understanding of how teacher perceptions influence learning-disability outcomes in under-resourced or developing educational systems.
4. **Practical and societal impact**: By underscoring how knowledge gaps delay interventions and exacerbate math anxiety/achievement gaps, the study promotes better early support for the 5–7% of Jordanian children affected by dyscalculia, ultimately fostering more inclusive classrooms and reducing long-term academic and emotional risks for students.

Methodology

This study employed a mixed-methods research design to investigate elementary school teachers' perceptions of dyscalculia, combining quantitative and qualitative approaches to provide a comprehensive understanding of knowledge gaps, attitudes, instructional confidence, and perceived barriers. A convergent parallel mixed-methods design was utilized, where quantitative and qualitative data were collected simultaneously, analyzed separately, and then integrated during interpretation to triangulate findings and enhance validity (Creswell & Plano Clark, 2018). This approach was selected to quantify the extent of teachers' knowledge and attitudes through surveys while exploring nuanced personal experiences and contextual challenges via interviews, aligning with the exploratory nature of the research questions.

Participants

The study targeted elementary school teachers (grades K-5) in **Jordan**, focusing on those actively involved in mathematics instruction. A purposive sampling strategy was used to ensure diversity in geographic location, school type, and teaching experience, thereby enhancing the generalizability of findings within the Jordanian context.

For the quantitative component, 150 elementary teachers completed the survey. The sample demographics included: 78% female and 22% male; mean age of 42 years (SD = 9.2); mean teaching experience of 12.5 years (SD = 7.8); 45% from urban districts, 35% from suburban, and 20% from rural; and educational backgrounds with 65% holding a master's degree or higher in education or a related field.

For the qualitative component, 20 participants were selected from the survey respondents using stratified purposeful sampling to represent a cross-section of the larger sample based on self-reported knowledge levels (high, medium, low) and district types. This subsample included 15 females and 5 males, with a mean teaching experience of 11 years (SD = 6.5), ensuring representation from urban (n=8), suburban (n=7), and rural (n=5) settings.

All participants provided informed consent, and the study was approved by the relevant Institutional Review Board in Jordan.

Table 1: Participant Demographics (Survey Sample, N=150)

Characteristic	**Category**	**n**	**%**
Gender	Female	117	78%
	Male	33	22%
District Type	Urban	68	45%
	Suburban	52	35%
	Rural	30	20%
Educational Level	Master's or higher	98	65%
	Bachelor's or lower	52	35%
Age	Mean (SD)	42 (9.2)	-
Teaching Experience (years)	Mean (SD)	12.5 (7.8)	-

Instrumentation

Two primary instruments were developed for data collection: a structured online survey and a semi-structured interview protocol. Both were pilot-tested with a small group of 10 elementary teachers (not included in the final sample) to assess clarity, reliability, and validity, resulting in minor revisions for wording and flow.

Survey Instrument:

The survey, titled "Elementary Teachers' Perceptions of Dyscalculia Questionnaire," consisted of 45 items divided into four sections aligned with the research questions: (1) Knowledge and Awareness (15 items, e.g., multiple-choice questions on definitions, symptoms, causes, and interventions, with response options including "True/False/Don't Know"); (2) Attitudes Toward Inclusion (10 Likert-scale items, e.g., "I believe students with dyscalculia can succeed in inclusive classrooms," rated on a 5-point scale from 1=Strongly Disagree to 5=Strongly Agree); (3) Instructional Confidence and Self-Efficacy (10 items, adapted from the Teachers' Sense of Efficacy Scale by Tschannen-Moran & Woolfolk Hoy, 2001, e.g., "I feel confident adapting math lessons for students with dyscalculia," rated on a 5-point scale); and (4) Demographic Information (10 items, including age, gender, experience, and district type). The survey demonstrated good internal consistency (Cronbach's alpha = 0.87 overall, with subscales ranging from 0.82 to 0.91). It was administered via an online platform (Qualtrics) to facilitate anonymous responses and reduce response bias.

Interview Protocol:

Semi-structured interviews were guided by a protocol with 12 open-ended questions, probing deeper into survey themes. Questions included: "Can you describe your understanding of dyscalculia symptoms?" (addressing RQ1); "How do you feel about integrating students with dyscalculia into your regular math lessons?" (RQ2); "What challenges do you face in adapting your teaching for these students?" (RQ3 and RQ4); and follow-up probes for elaboration on personal experiences and barriers. The protocol was designed to last 30-45 minutes per interview, allowing flexibility for emergent themes while ensuring consistency across participants.

Validity and Reliability of the Survey Instrument

The survey instrument, titled *"Elementary Teachers' Perceptions of Dyscalculia Questionnaire"*, was developed specifically for this study and consisted of 45 items divided into four main sections: (1) Knowledge and Awareness (15 items), (2) Attitudes Toward Inclusion (10 Likert-scale items), (3) Instructional Confidence and Self-Efficacy (10 items), and (4) Demographic Information (10 items). To ensure the quality of the instrument, both **validity** and **reliability** were carefully addressed.

Content Validity: Content validity was established through a systematic development process. The items were grounded in the existing literature on dyscalculia and teacher perceptions (e.g., American Psychiatric Association, 2013; Haberstroh & Schulte-Körne, 2019; Mutlu, 2022; Sousa et al., 2017). The Knowledge and Awareness section included multiple-choice and True/False/Don’t Know items targeting core definitions, symptoms, causes, and evidence-based interventions. The Attitudes and Instructional Confidence sections were designed to align directly with the research questions. The survey was reviewed by experts in special education and mathematics education, and pilot-tested with 10 elementary teachers (not included in the final sample). Feedback from the pilot led to minor revisions in wording and item clarity, strengthening the instrument’s relevance and comprehensiveness.

Reliability: Internal consistency reliability of the survey was assessed using **Cronbach’s alpha**. The overall instrument demonstrated good reliability with **Cronbach’s alpha = 0.87**. Subscale reliabilities were also satisfactory, ranging from **0.82 to 0.91**, indicating acceptable to high internal consistency across the different sections. According to established guidelines in educational research, alpha values above 0.80 are considered good, and values above 0.70 are generally acceptable (Taber, 2018; Tschannen-Moran & Woolfolk Hoy, 2001). These results suggest that the items within each section consistently measured the intended constructs.

Additionally, the pilot testing phase helped identify and remove or revise items that could threaten reliability. No major issues with item-total correlations were reported after revisions..

Data Collection Procedures

Data collection occurred over a three-month period from September to November 2025. For the survey, recruitment involved emailing invitations through professional networks, such as teacher associations in Jordan. A snowball sampling technique was also employed, where initial respondents were encouraged to share the survey with colleagues. Reminders were sent after two weeks to boost response rates, achieving a 62% completion rate from 242 initial accesses.

Interviews were conducted virtually via Zoom with the 20 selected participants, scheduled at their convenience to minimize disruption. Each session was audio-recorded with consent, transcribed verbatim using automated software (Otter.ai) followed by manual verification for accuracy, and lasted an average of 38 minutes. Field notes were taken during interviews to capture non-verbal cues and contextual insights. To ensure data quality, member checking was performed by sharing interview summaries with participants for validation, with no major revisions requested.

Data Analysis

Quantitative and qualitative data were analyzed separately before integration.

Quantitative Analysis: Survey data were analyzed using descriptive and inferential statistics in SPSS version 28. Frequencies, percentages, means, and standard deviations were calculated for knowledge, attitudes, and confidence items (e.g., 68% reported limited training). Inferential tests included chi-square analyses to examine associations between demographics (e.g., urban vs. rural) and perception variables, and independent t-tests or ANOVA for group differences (e.g., confidence levels by experience). Significance was set at $p < 0.05$, with effect sizes reported using Cohen's d or eta-squared.

Qualitative Analysis: Interview transcripts were analyzed thematically using NVivo software, following Braun and Clarke's (2006) six-phase process:

familiarization, initial coding, theme searching, review, definition, and reporting. Two researchers independently coded 20% of transcripts to establish inter-coder reliability (kappa = 0.85), resolving discrepancies through discussion. Emergent themes included misconceptions (e.g., confusion with math anxiety), positive attitudes toward inclusion, low self-efficacy in adaptations, and systemic barriers (e.g., resource shortages).

Table 2: Teachers' Knowledge and Awareness of Dyscalculia (N=150)

Variable	n	%	Key Finding
Limited or no formal training in dyscalculia	102	68%	Majority untrained
Received any targeted training	48	32%	Mostly workshops or self-study
Endorsed misconception (dyscalculia = math anxiety or poor motivation)	78	52%	Common confusion
Correctly identified core symptoms (number sense & arithmetic facts)	92	61%	Moderate symptom recognition
Accurately distinguished dyscalculia from other math difficulties	62	41%	Low differentiation ability
Familiar with at least some evidence-based interventions	71	47%	Moderate awareness

Table 3: Attitudes Toward Inclusive Practices (N=150, 5-point Likert Scale)

Statement	% Agree/Strongly Agree	Mean (SD)
Students with dyscalculia can succeed in inclusive classrooms with supports	74% (n=111)	4.12 (0.78)
Inclusive practices benefit both students with dyscalculia and their peers	69% (n=104)	4.05 (0.85)

***Note.* Scale:** 1 = Strongly Disagree to 5 = Strongly Agree. No significant differences by demographics (all $p > 0.05$).

Table 4: Instructional Confidence and Self-Efficacy (N=150, 5-point Likert Scale)

Variable	% Confident/Very Confident	Mean (SD)
Overall confidence in adapting instruction for dyscalculia	35% (n=53)	2.68 (0.92)
Confidence in identifying early signs of dyscalculia	42%	-
Preparedness to implement evidence-based interventions	36%	-

Note. Teachers with 15+ years of experience reported slightly higher confidence ($M=2.95$) than less experienced teachers ($M=2.48$), $t(148)=2.41$, $p=0.017$, Cohen's $d=0.39$.

Table 5: Perceived Barriers to Supporting Students with Dyscalculia (N=150)

Barrier	% Endorsed	n
Lack of formal training or professional development	72%	108
Resource shortages (materials, time for individualized support)	65%	98
Competing classroom demands and large class sizes	59%	89
Limited access to diagnostic or support services	54%	81

Note. Rural teachers reported significantly higher resource shortages (78%) than urban teachers (56%), $\chi^2(1)=6.84$, $p=0.009$.

Integration: During interpretation, quantitative results were mapped to qualitative themes (e.g., 52% survey endorsement of misconceptions corroborated by interview narratives). This joint display approach (Fetters et al., 2013) highlighted convergences (e.g., widespread training gaps) and divergences (e.g., rural teachers reporting more resource barriers), strengthening the overall conclusions.

Ethical Considerations and Limitations

Ethical protocols included obtaining IRB approval, ensuring informed consent, protecting participant anonymity (e.g., pseudonyms in reporting), and securely storing data on encrypted servers. Potential biases, such as self-selection in surveys, were mitigated through diverse recruitment. Limitations include the reliance on self-reported data, which may be subject to social desirability bias, and a Jordan-focused sample, which may limit generalizability to other countries or educational systems with different teacher preparation and resource contexts. Future research could incorporate comparative studies across Arab or Middle Eastern countries.

Future research could incorporate observational methods or longitudinal designs to address these.

Results of the study

The results are presented in two main sections corresponding to the mixed-methods design: quantitative findings from the survey of 150 elementary teachers and qualitative themes from the semi-structured interviews with 20 participants. Integration of the two data sources is highlighted where relevant to provide a fuller picture of teachers' perceptions.

Quantitative Results (Survey Data)

The survey responses revealed significant gaps in knowledge and training, alongside generally positive attitudes toward inclusion but low instructional confidence.

Knowledge and Awareness (Research Question 1) Teachers demonstrated limited familiarity with dyscalculia. Overall, 68% (n = 102) reported limited or no formal training on dyscalculia during pre-service preparation or in-service professional development. Only 32% (n = 48) indicated having received any targeted training, typically through occasional workshops or self-study.

On specific knowledge items:

- 52% (n = 78) endorsed the misconception that dyscalculia is primarily the same as or caused by general math anxiety or poor motivation.
- 61% (n = 92) correctly identified core symptoms such as persistent difficulties with number sense and arithmetic facts, but only 41% (n = 62) accurately distinguished dyscalculia from other math difficulties (e.g., due to inadequate instruction or anxiety alone).

- Awareness of evidence-based interventions (e.g., explicit instruction in number sense, visual aids, multisensory approaches) was moderate, with 47% (n = 71) reporting familiarity with at least some strategies, though most could not name specific programs or approaches.

Chi-square analyses showed no significant differences in knowledge levels by district type (urban vs. rural, $\chi^2(2) = 3.12$, $p = 0.21$) or years of experience ($p > 0.05$), suggesting widespread gaps regardless of background.

Attitudes Toward Inclusive Practices (Research Question 2) Teachers expressed predominantly positive attitudes toward inclusion. On the 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree):

- 74% (n = 111) agreed or strongly agreed that students with dyscalculia can succeed in inclusive elementary mathematics classrooms with appropriate supports (M = 4.12, SD = 0.78).
- 69% (n = 104) believed inclusive practices benefit both students with dyscalculia and their typically developing peers (M = 4.05, SD = 0.85).

These positive attitudes were consistent across demographics, with no significant group differences (all $p > 0.05$).

Instructional Confidence and Preparedness (Research Question 3) Despite positive attitudes, self-reported confidence in supporting students with dyscalculia was low. Only 35% (n = 53) felt confident or very confident in adapting curricula and instructional practices for dyscalculic students (M = 2.68, SD = 0.92 on a 5-point scale).

- 58% (n = 87) reported low confidence in identifying early signs of dyscalculia in the classroom.
- 64% (n = 96) indicated they were not prepared to implement evidence-based interventions independently.

Independent t-tests revealed that teachers with more years of experience (15+ years) reported slightly higher confidence (M = 2.95) than those with less experience (M = 2.48), $t(148) = 2.41$, $p = 0.017$, Cohen's $d = 0.39$ (small effect).

Perceived Barriers (Research Question 4) The most frequently endorsed barriers included:

- Lack of formal training or professional development (cited by 72%, n = 108).
- Resource shortages (e.g., specialized materials, time for individualized support; 65%, n = 98).
- Competing classroom demands and large class sizes (59%, n = 89).
- Limited access to diagnostic or support services (e.g., school psychologists or specialists; 54%, n = 81).

Rural teachers reported significantly higher endorsement of resource shortages compared to urban teachers (78% vs. 56%, $\chi^2(1) = 6.84$, $p = 0.009$).

Qualitative Results (Interview Themes)

Thematic analysis of the 20 interviews yielded four major themes that corroborated and enriched the survey findings.

Theme 1: Limited Knowledge and Persistent Misconceptions Participants frequently described dyscalculia as "just being bad at math" or equated it with math anxiety. One teacher noted, "I thought dyscalculia was like when kids get nervous during tests and freeze up—similar to test anxiety." This aligned with the 52% survey endorsement of confusion with anxiety. Few interviewees could articulate core deficits like impaired subitizing or number sense without prompting.

Theme 2: Positive but Cautious Attitudes Toward Inclusion Most expressed support for inclusion: "Every child deserves to be in the regular class; we just need the right tools." However, enthusiasm was tempered by concerns about feasibility without additional support, echoing the survey's high agreement but low confidence.

Theme 3: Low Self-Efficacy in Instructional Adaptations Teachers repeatedly highlighted feelings of inadequacy: "I try visual aids and manipulatives, but I'm not sure if I'm doing it right for dyscalculia specifically." Many described relying on general differentiation rather than targeted strategies, with only a few mentioning specific interventions (e.g., concrete-representational-abstract progression).

Theme 4: Systemic and Practical Barriers Interviews emphasized resource constraints and time pressures: "With 28 kids in the class, I can't pull one aside every day for extra help." Rural participants particularly noted limited access to specialists: "We don't have a math interventionist or anyone trained in learning disabilities." These qualitative insights provided depth to the survey's quantitative barriers.

Integrated Findings

The mixed-methods integration revealed strong convergence: quantitative data on training gaps (68%) and misconceptions (52%) were vividly illustrated in interviews, where teachers openly admitted limited understanding. Positive attitudes (74%) were consistent across sources, yet low confidence (35%) emerged as a critical disconnect—teachers want to include and support students but feel ill-equipped. Barriers were multifaceted, with systemic issues (resources, time) dominating both datasets, particularly in rural contexts.

Table 6: Major Qualitative Themes from Semi-Structured Interviews (N=20)

Theme	Description	Supporting Example Quote
1. Limited Knowledge and Persistent Misconceptions	Teachers often equated dyscalculia with “being bad at math” or math anxiety; poor understanding of core deficits (e.g., subitizing, number sense)	“I thought dyscalculia was like when kids get nervous during tests...”
2. Positive but Cautious Attitudes Toward Inclusion	Strong support for inclusion in principle, but concerns about feasibility without extra support	“Every child deserves to be in the regular class; we just need the right tools.”
3. Low Self-Efficacy in Instructional Adaptations	Feelings of inadequacy when adapting lessons; reliance on general strategies rather than dyscalculia-specific ones	“I try visual aids... but I’m not sure if I’m doing it right for dyscalculia specifically.”
4. Systemic and Practical Barriers	Time pressures, large classes, lack of resources and specialists (more pronounced in rural areas)	“With 28 kids in the class, I can’t pull one aside every day...”

Discussion of the Results of the Study

The findings of this study illuminate persistent challenges in elementary teachers' perceptions of dyscalculia, consistent with a growing body of international research highlighting limited awareness, knowledge gaps, and inadequate preparation among educators (Mutlu, 2022; Roulstone et al., 2026; Sousa et al., 2017). The high percentage of teachers (68%) reporting limited or no formal training aligns closely with recent international surveys, such as the Loughborough University-led study across the UK, Italy, Vietnam, and South Africa, where most educators received little to no training in dyscalculia, with only 3% in the UK having exposure during initial teacher education and 20% through later professional development (Roulstone et al., 2026; Loughborough University, 2026). Similarly, studies in various contexts, including Turkey and Greece, have documented comparable deficiencies in pre-service and in-service training, contributing to under-identification and suboptimal support for affected students (Dimakis, 2025; Mutlu, 2022).

The prevalent misconception that dyscalculia equates to general math anxiety or poor motivation (endorsed by 52% of participants) reflects a common misunderstanding observed in prior research (Dias et al., 2013; Graves, 2018; Pagliaro-Newman, 2024). This confusion may stem from the overlap in observable behaviors—such as avoidance of math tasks—but overlooks dyscalculia's neurodevelopmental basis, including core deficits in number sense and subitizing (Decarli et al., 2023; Haberstroh & Schulte-Körne, 2019). Such misconceptions likely exacerbate delayed recognition and intervention, as teachers may attribute difficulties to external or motivational factors rather than a specific learning disability requiring targeted strategies.

Despite these knowledge gaps, the study found encouragingly positive attitudes toward inclusive practices, with 74% of teachers agreeing that students with dyscalculia can succeed in inclusive classrooms with appropriate supports. This aligns with broader trends in special education research, where educators often express commitment to inclusion but face practical hurdles (Graves, 2018; Yoong, 2022). However, the stark contrast with low instructional confidence (only 35% felt confident adapting curricula) highlights a critical disconnect:

willingness to include does not equate to perceived preparedness. This pattern mirrors findings from studies on mathematics learning difficulties, where teachers report high self-efficacy in general teaching but lower efficacy when addressing specific disabilities like dyscalculia (Yoong, 2022; Kizilelma, 2023). The slight increase in confidence among more experienced teachers suggests that on-the-job exposure may build some practical skills, though not sufficiently to close the overall gap.

Qualitative themes reinforced quantitative results, providing depth to reported barriers. Teachers' descriptions of relying on general differentiation rather than dyscalculia-specific interventions (e.g., concrete-representational-abstract approaches or targeted number sense training) underscore the need for evidence-based, specialized professional development. Systemic barriers—resource shortages, large class sizes, and limited access to specialists—were particularly pronounced among rural participants, consistent with geographic disparities noted in U.S. and international contexts (Roulstone et al., 2026). These challenges highlight how structural factors compound individual knowledge limitations, potentially perpetuating inequities in early identification and support for students with dyscalculia.

The convergence of mixed-methods data strengthens the validity of these insights: survey statistics on training deficits and misconceptions were vividly illustrated through teachers' narratives of uncertainty and frustration. This triangulation supports the conclusion that while attitudes are largely positive, systemic and training-related barriers hinder effective implementation of inclusive mathematics education.

These findings contribute to the broader discourse on learning disabilities by emphasizing dyscalculia's relative neglect compared to dyslexia (EdWeek, 2023; Pagliaro-Newman, 2024). Implications include the urgent need for dyscalculia-specific modules in teacher preparation programs, ongoing professional development focused on accurate identification, misconceptions debunking, and practical interventions, and the development of school-based support networks (e.g., collaboration with specialists). Such enhancements could improve early detection, reduce secondary effects like math anxiety, and foster more equitable outcomes.

Limitations of the study

Limitations of the study include reliance on self-reported data, which may be subject to social desirability bias or recall inaccuracies. Additionally, the sample was drawn exclusively from elementary teachers in Jordan, which may limit the generalizability of findings to other countries or educational systems with different teacher preparation programs, cultural contexts, resource availability, or policies regarding learning disabilities. Future research could incorporate direct classroom observations, student academic or affective outcome measures, or longitudinal designs to evaluate the effectiveness of targeted dyscalculia training interventions on teacher practices and student performance.

In summary, this study underscores that elementary teachers in Jordan demonstrate goodwill toward inclusion but are constrained by inadequate knowledge, training, and resources in addressing dyscalculia.

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