Cakrawala Pendidikan
Jurnal Ilmiah Pendidikan
Vol. 45 No. 1, February 2026, pp.208-221
https://jurnal.uny.ac.id/index.php/cp/issue/view/3047
DOI: https://doi.org/10.21831/cp.v45i1.94272

Teachers' feedback in inclusive classrooms: A mixed method study

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ABSTRACT

Feedback, which is important for every environment involving communication, plays a key role in solving the difficulties experienced by students, especially in learning environments. In this study, mixed method research was conducted to determine the awareness of mathematics and classroom teachers working in inclusive classrooms about giving feedback and how students with learning difficulties (LD) perceive their teachers' feedback. In the qualitative phase of the study, where an exploratory sequential design (sequential qualitative → quantitative) from mixed research methods was used, interviews were conducted with teachers and students, the data obtained from these interviews were analyzed and an item pool was created for the 'Teachers' Feedback Awareness Scale in Inclusive Classrooms (TFASIC)' by using the framework in the literature for feedback. In the quantitative phase of the study, the validity and reliability data of the scale were collected and analyzed. Qualitative data revealed that the feedback given by the teachers differed in terms of type, clarity, depth, focal point and mode of delivery. It was concluded that students with LD who evaluated teachers' feedback received feedback under these five headings. The TFASIC proved to be a measurement tool that produces valid and reliable results.

Keywords: feedback awareness, inclusion, mixed method, learning disability, teacher

Article history

Received:	*Revised:*	*Accepted:*	*Published:*
17 September 2025	*05 November 2025*	*24 December 2025*	*01 February 2026*

Citation (APA Style): Karamık, G. A., Özkaya, A., Sönmez, N. & Ayvallı, M. (2026). Teachers' feedback in inclusive classrooms: A mixed method study. *Cakrawala Pendidikan: Jurnal Ilmiah Pendidikan, 45*(1), pp.208-221. DOI: https://doi.org/10.21831/cp.v45i1.94272

INTRODUCTION

How do we recognize what and how much we have learned? Is learning driven by the process or the result? Do we find answers through peers, teachers, or inner experiences? Or are our questions only resolved when final answers are given? If you are a student with a learning disability (LD) in an inclusive classroom, or the teacher, where should you seek these answers? These questions lead educators to the concept of 'feedback'. Feedback spans many disciplines (e.g., econometrics, education, communication) and forms (e.g., oral, written). Historically, it parallels the idea of 'thought' (Bode, 2017). Generally, it is defined as two-way communication linked to outcome information or error correction (Gibbs & Simpson, 2004), and in education, as all dialogue that supports learning (Askew & Lodge, 2004). Providing appropriate feedback is crucial in any communicative setting and especially vital for addressing the challenges faced by students with LD. In mathematics education, an abstract field, understanding feedback structures in inclusive classrooms is essential. This study aims to explore how teachers understand feedback, identify its types in inclusive classrooms, and determine which are most effective for students with LD.

Mathematics is a science of order and pattern, and both constructivism and sociocultural theory play key roles in its teaching (Van de Walle et al., 2014). These perspectives are reflected in the Principles and Standards for School Mathematics (PSSM) by the NCTM (2000), which include principles (equity, curriculum, teaching, learning, assessment, and technology) and standards (Content: number and operations, algebra, geometry, measurement, data analysis; and Process: problem solving, reasoning, communication, connections, representation). PSSM

highlights that every child can learn mathematics, but students with learning difficulties may need more time, or more oral instead of written assessments, or additional support like tutoring. The assessment principle also stresses the role of feedback in helping students set goals, take responsibility, and become independent learners (NCTM, 2000). Mathematics teaching should involve teachers facilitating knowledge construction rather than transmitting it (Holt-Reynolds, 2000). Teacher feedback and the sociocultural context of the learner support knowledge building and are aligned with PSSM principles. Studies in literature underscore the role of feedback in mathematics education (Berner et al., 2022; Chin, 2006; Hu et al., 2021; Kim et al., 2019; Truxaw, 2020), noting it should be clear, focused, and stimulate mathematical thinking. Feedback should avoid simple 'correct/incorrect' judgments and instead encourage dialogue (Truxaw, 2020). In inclusive classrooms, what feedback means for both students and teachers can vary. It may hold shared meanings for students with and without LD or reflect distinct experiences. Revealing these perspectives is key to raising feedback awareness in inclusive settings.

Inclusion involves educating students with unique learning needs alongside their peers while offering necessary special education support (York & Tundidor, 1995). Inclusive classrooms reflect various aspects, practices, methods, materials, but a shared theme among them is 'feedback'. Cooperative and individualized teaching approaches indicate that students with academic delays can be accepted by peers, and teacher feedback plays a critical role (Madden & Slavin, 1983). Feedback in inclusive settings is vital for addressing learner needs and raising teacher awareness (Liu & Aryadoust, 2024). A teacher's understanding of student needs is closely linked to the feedback provided, whether related to academic content or individual behavior. In mathematics, being abstract in nature, feedback requires development both in disciplinary and behavioral dimensions, particularly for inclusive classrooms. The National Mathematics Advisory Panel [NMAP] (2008) reported that effective instruction for students with mathematical difficulties improves verbal problem-solving and calculation. Positive effects arise when teachers model problem-solving explicitly, allow practice, encourage thinking aloud, and offer comprehensive feedback. For students with LD, such structured instruction, frequent teacher-student interaction, clear feedback, and well-sequenced problems, proves essential. The current study is based on the feedback framework developed by Woods (2015).

Woods (2015) defines feedback through five dimensions: type, focus, depth, clarity, and delivery. Each dimension includes multiple features and functions as part of a complex system present throughout the feedback process. This study, grounded in Woods' framework, aims to identify how these feedback dimensions manifest for students with LD and their teachers in inclusive classrooms. To explore this, the five dimensions were first explained and then examined in the context of inclusive education. The first dimension, type, includes five constructs. Formal feedback aligns with curriculum goals, while informal feedback occurs outside of planned instruction (Yorke, 2003). Feedback can be formative, aimed at improving learning, or summative, reflecting performance through grades (Sinclair & Cleland, 2007). Another component is the source: instructor-student or peer-to-peer. Woods (2015) emphasizes the value of constructive feedback from teachers and peers, including both encouragement and critique, and the roles of self- and peer assessment. Studies show that self-regulation is prominent in feedback practices for students with LD in inclusive classrooms (Graham et al., 2013; Ness & Middleton, 2012; Wery & Nietfeld, 2010).

The study aims to identify teachers' feedback practices and develop a scale to measure their feedback awareness. Research questions include: (1) What feedback does teachers use in inclusive classrooms, and why? (2) What feedback does students with LD receive, and what are its strengths and weaknesses? (3) Is the teacher's feedback awareness scale valid and reliable?

METHOD

This study used an exploratory sequential mixed methods design (qualitative → quantitative) (Creswell & Plano Clark, 2018) to determine teachers' feedback awareness in inclusive classrooms. The research was approved by the ethics committee of the researchers' university. Mixed methods combine qualitative and quantitative techniques, utilizing the strengths

of both (Tashakkori et al., 2021). In this design, qualitative data is collected first to explore the topic, and the findings guide the quantitative phase (Creswell & Plano Clark, 2018). The design was chosen for its developmental purpose (Greene et al., 1989). In the first phase, interviews were conducted to collect qualitative data. These findings were used to create an item pool for the scale in the second, quantitative phase. This stage focused on collecting validity and reliability data and conducting statistical analyses. In the final phase, results from both stages were interpreted together (Plano Clark, 2019).

Research process

Phase I: Qualitative phase

Participants

In the qualitative phase, participants included mathematics and classroom teachers working in inclusive classrooms and resource rooms, along with students diagnosed with LD attending both settings in a public secondary school. Participants were selected via purposive sampling. Teacher selection criteria were: (a) having a student with LD in class, (b) teaching in the resource room, (c) at least 3 years of teaching experience, and (d) volunteering for the study. Six mathematics teachers and four classroom teachers who met these criteria participated. Table 1 presents the demographic details of the teacher participants in the qualitative phase.

Table 1. Characteristics of teacher participants

Variables	Gender	Age	Educational Status	Faculty of Graduation	Year of Experience
T1	F	30	License	Education	7
T2	M	35	Master's Degree	Education	11
T3	M	32	License	Science	9
T4	F	45	License	Education	23
T5	F	42	Master's Degree	Education	20
T6	M	40	License	Education	18
T7	F	33	License	Education	10
T8	F	39	License	Science	17
T9	M	31	License	Science	8
T10	M	34	License	Education	11

According to Table 1, the teacher group consisted of 5 females and 5 males; all but two held a bachelor's degree. Their ages ranged from 30 to 45, most graduated from faculties of education, and their teaching experience ranged from 7 to 23 years.

Student participants met the following criteria: (a) diagnosed with LD, (b) receiving supportive education, (c) attending school regularly, and (d) having parental consent. The study included 10 students, 6 from middle school and 4 from primary school, who met these conditions. Table 2 presents their demographic information.

Table 2. Characteristics of student participants

Variables	Gender	Grade
S1	F	3
S2	F	3
S3	M	4
S4	F	3
S5	M	5
S6	F	5
S7	M	7
S8	M	8
S9	F	6
S10	M	6

Table 2 shows that the participants consisted of 5 female and 5 male students, 3 third graders, 1 fourth grader, 2 fifth graders, 2 sixth graders, and 1 each in the seventh and eighth grades.

Data collection

In the qualitative phase, semi-structured interviews were conducted with teachers and students to gather data. This method allowed for in-depth insights and understanding of participants' perspectives. Interview questions were based on the framework by Woods (2015) and compiled into the Feedback Interview Form in Inclusive Classrooms (FIFIC), aimed at generating data for the scale item pool. Initially, all authors drafted questions, which were then pooled and refined through discussion. The form included two parts: demographic information and interview questions. It was reviewed by 10 experts in special and mathematics education. After incorporating their feedback, a pilot interview was conducted with one teacher and one student to test clarity and timing. Following final revisions, interviews were conducted one-on-one in the school's resource room using the FIFIC. Audio was recorded, and written consent was obtained from participants and student parents. During each session, the participant, the interviewer, and two co-authors were present to take notes and manage recordings.

Data analysis

Interview data were analyzed using descriptive analysis. Clarke & Brown (2016) outline the process of creating a thematic framework, organizing data accordingly, and identifying findings. In this context, direct participant quotes were included. Interviews conducted with FIFIC were transcribed, and researchers, two experts in mathematics education and two in special education, independently coded and created themes based on the transcripts. The consistency of these codes and themes was then reviewed collaboratively. Following Miles and Huberman (1994), the code agreement was calculated using the formula: $\Delta = C \div (C+\partial) \times 100$, where Δ is the reliability coefficient, C the number of agreed items, and ∂ the disagreements. Intercoder agreement was found to be 95%. After necessary revisions, the final codes and themes presented in the findings were established.

Phase II: Quanitative phase

Participants

Table 3. Demographic characteristics of the study groups

Variable	Characteristics	EFA		CFA	
		Frequency (n=350	Percent	Frequency (n=396)	Percent
Gender	Female	238	68	274	69.2
	Male	112	32	122	30.8
Highest level of education	License	299	87.2	356	89.9
	Master's degree	41	12	38	9.6
	PhD	3	0.9	2	0.5
Faculty of graduation	Faculty of Education	319	91.1	323	83.2
	Faculty of Science	19	5.4	32	8.2
	Other	12	3.4	33	8.5
Current school	Primary School*	209	60.8	306	77.3
	Middle School**	135	39.2	90	22.7
Year of experience	01-May	21	6	6	1.5
	06-Oct	50	14.2	22	5.6
	Nov-15	64	18.2	34	8.6
	16-20	96	27.4	76	19.2
	21-25	47	13.4	76	19.2
	26 +	71	20.2	182	46

Note: *All participants in primary school are classroom teachers.
** All participants in middle school are math teachers.

In the quantitative phase of the study, mathematics teachers working in state-affiliated secondary schools with students with LD in their classrooms and classroom teachers working in primary schools were selected as participants. The characteristics of the participants whose data was used in the quantitative analysis are given in Table 3.

Data collection

The "Teachers' Feedback Awareness Scale in Inclusive Classrooms (TFASIC)" is a 5-point Likert-type scale (1 = Strongly disagree, 5 = Strongly agree) with 20 final items (Appendix 1). The initial 35-item form of the scale was sent to 10 academics in the fields of special education, measurement and evaluation, and mathematics education for expert review. After revisions based on experts' feedback, the scale was reduced to 28 items. Hard copies of the scale, along with ethics approval, were distributed to 48 schools during site visits. Following adjustments based on EFA results, data were collected by the researchers through visits to primary and secondary schools in three central districts for the CFA phase. Data collection took place between April 8–27, 2024 (EFA) and May 13–31, 2024 (CFA).

Data analysis

Before conducting analysis first, univariate and multivariate outliers were screened. Z scores were used to detect univariate outliers, and values beyond ±3 were excluded (Raykov & Marcoulides, 2008). Mahalanobis Distance was used for multivariate outliers, but none were found. As a result, 75 outliers were removed from EFA data and 33 from CFA data. Analyses were conducted on 351 (EFA) and 396 (CFA) participants, which were considered adequate sample sizes (Comrey & Lee, 1992). Normality was assessed using skewness and kurtosis; values within ±1 was accepted as normal (Tabachnick & Fidell, 2013). EFA was conducted in SPSS 25 using principal axis factoring. Data suitability was checked via the KMO coefficient and Bartlett's test. CFA was conducted with the lavaan package in R (Rosseel, 2019), using the WLSMV estimation method suitable for ordinal data (Brown, 2006). CFA results were evaluated using $\chi 2$, $\chi 2/df$, CFI, RMSEA, TLI, and SRMR indices. Internal consistency was assessed with Cronbach's Alpha and McDonald's Omega using JAMOVI

FINDINGS AND DISCUSSION

Findings

Qualitative phase findings

RQ 1: What is the feedback used by teachers in inclusive classrooms? Why do they use this feedback?

The data on the themes and sub-themes related to the feedback perceptions of teacher participants of the qualitative phase of the study are shown in Table 4.

As seen in Table 4, teachers' feedback perceptions are categorized under five themes: type, clarity, depth, focus, and delivery. The "type" theme includes subthemes such as avoiding feedback solely for grading, using non-curricular resources, being encouraging, considering LD students' needs and characteristics, promoting self-regulation, concerns about peer evaluation among LD students, and instances where LD students provide feedback to teachers. Participants expressed these views as follows:

> *T5: "...For example, I don't say I should give feedback, see if the child understands, and give a grade accordingly. After all, it is also difficult for us to evaluate mainstream students. We may have problems in grading, but I never use feedback for this purpose..."*
>
> *T9: "...We don't give grades in these classes anyway. For a student in a special situation, feedback should not be associated with grade anxiety. Feedback will not achieve its purpose if it carries grade anxiety..."*

The "clarity" theme includes five sub-themes: clearly stating the purpose of feedback, ensuring it is understood by the student with LD, linking it to daily life, highlighting what was

done correctly, and pointing out what was done incorrectly. Participants illustrated these points as follows:

T3: "...It is very important that it is understood by the student... Especially the feedback given in the classroom, they say they understand and sometimes they do not even ask questions. But when the individual program is applied, the apprehensible feedback given by associating it with daily life is important..."
T7: "...I give feedback to both the part that he/she does right and the part that he/she does wrong. If it is right, he/she is encouraged by me saying well done, but for wrong, feedback needs to be given in more detail."

Table 4. Teachers' feedback on inclusive classrooms

Theme	Subtheme	f_1	f_2
Type	Not using feedback for grading purposes	4	4
	Using resources outside the curriculum	5	3
	Being encouraging	6	3
	Taking into account the needs of students with LD	5	4
	The necessity for students with LD to assess each other	3	3
	The teacher should solve the question themselves	2	4
	The fact that students with LD assess each other is upsetting	5	4
	Taking into account the characteristics of students with LD	3	4
	The necessity for students with LD to support their self-regulation	4	2
	The necessity for students with LD to give feedback to their teachers	2	3
Clarity	The purpose of the feedback given should be stated clearly and explicitly	3	4
	It should be understood by students with LD	3	2
	It should be related to daily life	3	4
	Feedback should be given on what is done correctly	4	4
	Feedback should be given on what is done incorrectly	5	4
Depth	Complex feedback should not be given to students with LD	3	4
	Feedback should include detailed explanations	4	3
	Feedback should be given at a sufficient level	4	3
Focus	It should be process-oriented	3	4
	It should vary depending on the subject	3	4
	It should be content-oriented	4	3
Delivery	Inadequacy of technology	2	2
	Written feedback depending on student characteristics	4	4
	Immediate feedback should be given	2	3
	Varying depending on student characteristics (such as written, verbal)	5	4
	Multiple feedback notification must be given	3	3

Note: f_1: Math teacher frequency, f_2: Classroom teacher frequency

The "depth" theme consists of three sub-themes: avoiding overly complex feedback for students with LD, providing detailed explanations, and offering feedback at an appropriate level. Participants described these ideas as follows:

T2: "... When you give feedback constantly, things get complicated. For example, there should be a limit. Neither too little nor too much feedback should be given. If too much feedback is given, they expect feedback to be given constantly because..."
T8: "... It should be simple. When you use too many sentences, it is complicated for the child. Feedback should contain simpler sentences..."

The "focus" theme includes three sub-themes: being process-oriented, varying by subject, and being content-focused. Participants reflected these points as follows:

T1: "... For me, the result is not important. I mean, it is not true that he/she found the result. How much effort they put into the process is very valuable. Therefore, it should be process oriented. If the result is in my feedback, they cannot assimilate the mathematical process..."
T7: "... We also give points to the steps of solution of the problems, we take it into consideration, but for example, while they can see clear expressions about natural

numbers, they cannot see clear results in geometry. When this happens, my feedback style changes on a subject basis..."

The "delivery" theme includes the following sub-themes: limited access to technology, using written feedback based on student characteristics, providing immediate feedback, adapting feedback type (e.g., written or verbal) to the needs of students with LD, and offering multiple forms of feedback. Participants shared these views as follows:

T2: "... I usually try to give written feedback, but for example, during the Covid pandemic process, we were technologically inadequate, we could not give feedback..."

T8: "... Feedback given only once in a single way is not enough. It also depends on the characteristics of the mainstream student, but I both write and tell, sometimes I send audio recordings to the family...".

RQ 2: What are the types of feedback received by students with learning disabilities? What do they think about the positive and negative aspects of this feedback?

The types of feedback received by students with LD in inclusive classrooms are presented in Table 5.

Table 5. Feedback received by students in inclusive classes

Theme	Subtheme	f_1	f_2
Type	Worrying about being graded	4	2
	Being interested in extra sources (textbooks/documents/worksheets etc.) Attracting the interest of non-program resources	5	3
	Giving feedback with words that help them feel good	4	3
	The offence of peers' evaluations	4	2
	To be able to organize coursework	2	2
Clarity	Being clear about the purpose of the given feedback	3	3
	It should be associated with daily life.	4	3
	Giving feedback about what was done wrong	4	3
Depth	Feedback should include detailed explanations	3	4
Focus	Varies depending on the subject	3	3
Delivery	Understanding written feedback	4	4
	Providing instant feedback	4	4

f1:5-8th class students' frequency, f2:1-4th class students' frequency

Analysis of Table 5 shows that the themes of type, clarity, depth, focus, and delivery were identified. Under the "type" theme, five sub-themes emerged: concern about being graded, interest in out-of-class resources, receiving encouraging feedback, feeling hurt by peer evaluation, and managing their own course work. Participants described these experiences as follows:

S1: "... When my teacher says something in class, sometimes I feel like my friends get involved and laugh. But I don't feel that way when only my teacher and I do the lesson (IEP)..."

S7: "... When I ask my teacher a question and she answer me; I am very happy when she says well done. Sometimes she nods, I just know she approves me..."

The "clarity" theme includes three sub-themes: clearly stating the purpose of feedback, linking it to real-life situations, and pointing out what was done incorrectly. Participants reflected these ideas as follows:

S3: "... Focusing only on what I did wrong to correct it and not on what I did right affects me a little negatively..."

S8: "... I know why my teacher always responds because she explains it clearly beforehand. I know what to correct and why to correct, but I can't always do it..."

The "depth" theme includes the sub-theme that feedback should provide detailed explanations. Participants shared this view as follows:

S5: "...I don't understand when it's unclear. Why, because I don't understand the answer like that. I can't pay attention anyway, and when all of them are combined and there's no answer, it's not understood..."

S9: "...He explains in detail, when I can't do it, there is not much opportunity in the classroom, but when I work one-on-one, I understand when it is detailed..."

The "focus" theme includes the sub-theme that feedback varies based on the subject matter. Participants explained this as follows:

S2: "...In patterns, for example, my teacher drew and showed it to me, then I understood..."

S10: "...I found the angles in the triangle very difficult, but if the teacher solved a few more examples and explained it in detail, I would understand, but..."

The "delivery" theme includes two sub-themes: understanding written feedback and receiving immediate feedback. Participants described these experiences as follows:

S4: "...Until the end of the lesson, the problem we solved at the beginning was stuck in my mind, in fact I asked it, but I guess I got stuck when I wasn't answered immediately..."

S9: "...When I open my notebook later and look at it, I understand better what my teacher wrote in my notebook. Also, it is better if she writes with a red pen..."

Qualitative phase findings: Validity and reliability findings of the teachers' feedback awareness scale in inclusive classrooms

Exploratory Factor Analysis (EFA) result

Before performing EFA, Kaiser-Meyer-Olkin (KMO) coefficient and Bartlett's test of Sphericity were performed, and the results are shown in Table 6.

Table 6. KMO and bartlett test results

Test		Value
Kaiser-Meyer-Olkin (KMO) Sample Suitability Measure		0.927
Bartlett Sphericity Test	X^2	3.859.837
	sd	190
	p	0.000

The Kaiser-Meyer-Olkin (KMO) value was 0.927, indicating sampling adequacy. Bartlett's Test of Sphericity was significant ($\chi 2 = 3859.837$, df = 190, p = 0.000), suggesting suitability for factor analysis (Field, 2000). Principal axis factoring revealed two components with eigenvalues over 1. However, considering total explained variance, the scree plot (Figure 1), and theoretical foundations from the item development process, the analysis proceeded with a single-factor model.

As shown in the scree plot (Figure 1), the curve levels off after the second point, indicating that subsequent factors contribute minimally and similarly to the variance. In the exploratory factor analysis, 0.40 was set as the minimum acceptable factor loading (Tabachnick & Fidell, 2013). Based on the analysis of 20 items, the single factor explained about 41% of the total variance. Table 7 presents the eigenvalues and total variance explained.

Table 7. Eigenvalues and total variance

	Initial Eigenvalues			Extraction Sum of Squared Loadings		
Factor	Total	% of Variance	% Cumulative	Total	% of Variance	% Cumulative
1	8.703	43.514	43.514	8.168	40.839	40.839

The results of the factor design and factor loading values of the scale are shown in Table 8.

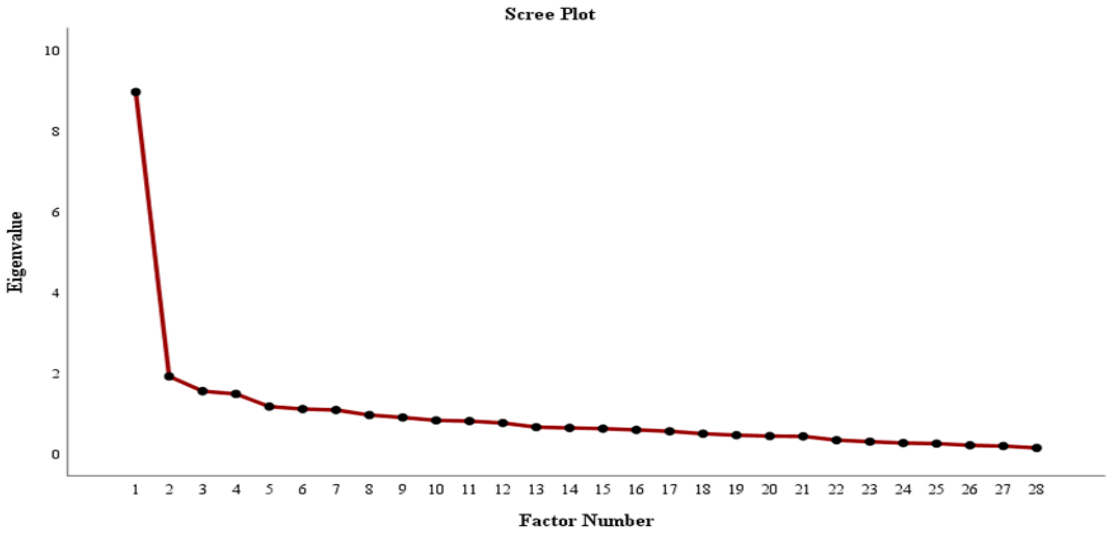

Figure 1. Scree plot

Table 8. TFASIC's item's factor loadings

Items	Factor 1
I1	0.425
I3	0.495
I4	0.432
I5	0.450
I8	0.432
I9	0.561
I10	0.778
I11	0.755
I12	0.634
I14	0.539
I16	0.667
I17	0.645
I18	0.691
I19	0.647
I21	0.567
I22	0.801
I23	0.770
I24	0.797
I25	0.722
I26	0.717

When the results of the factor design and factor loading values were evaluated, it was determined that the factor loading values of the items varied between 0.425 and 0.801.

Confirmatory Factor Analysis (CFA) results

According to the results of the confirmatory factor analysis for the single factor determined in EFA for TFASIC, all t values were found to be significant at the 0.01 level because they exceeded 2.56 and no item with an error variance above 0.90 was identified. The results of the CFA are shown in Table 9 and Figure 2.

Table 9. CFA result

	X^2	sd	⁄sd	RMSEA (%90 CI)	CFI	TLI	SRMR
Model	528.21	167	3.16	0.074(0.067-0.01)	0.99	0.99	0.053

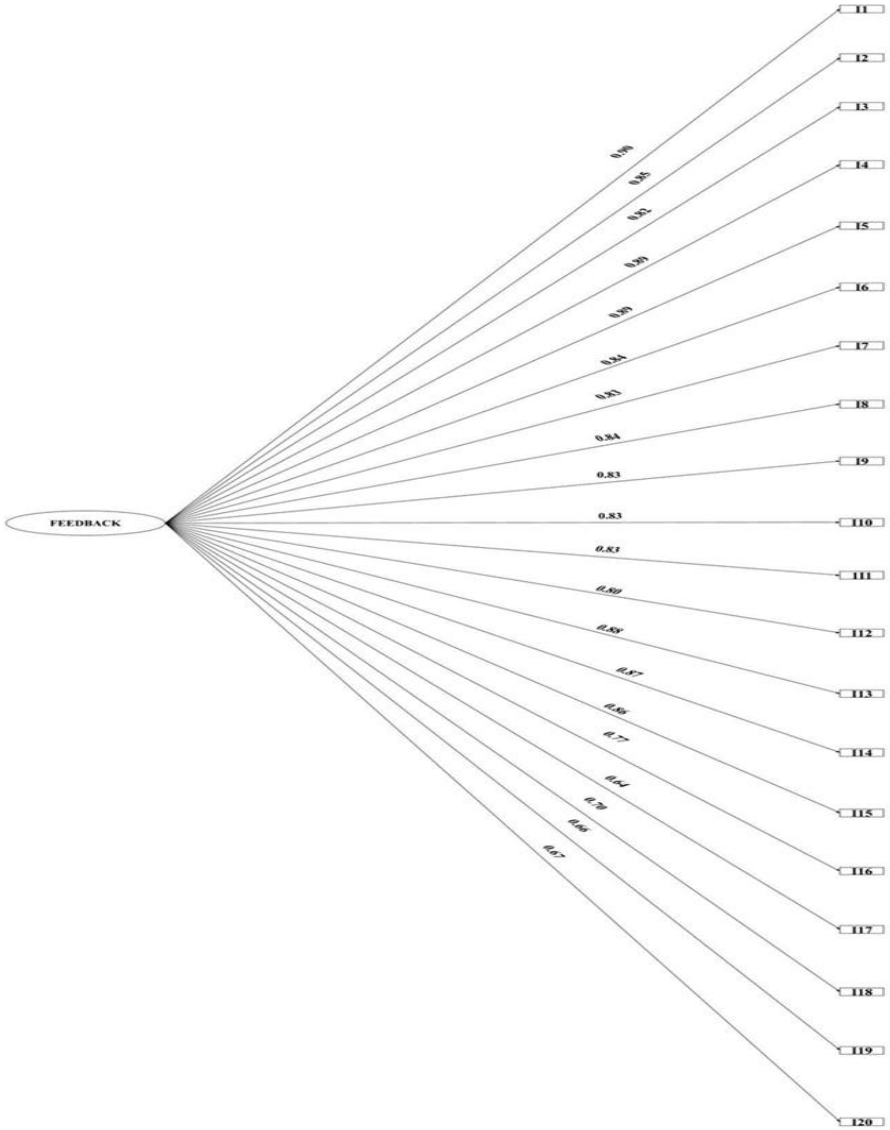

Figure 2. Path diagram of teachers' feedback awareness scale in inclusive classrooms

According to CFA results, the χ^2/sd ratio was below 5, indicating good model fit (Sümer, 2000). RMSEA was under 0.08, also suggesting good fit (Jöreskog & Sörbom, 1993). CFI and TLI values exceeded 0.95, reflecting excellent fit and SRMR was below 0.08, indicating good fit (Hu & Bentler, 1999). Overall, the single-factor structure of TFASIC was confirmed.

Reliability results

The results of the reliability Cronbach α and McDonald's Ω coefficients of the scale in terms of internal consistency are shown in Table 10.

Table 1. Reliability results

	Cronbach α	McDonald's Ω
EFA	0.904	0.920
CFA	0.950	0.953

When the results in Table 10 are analyzed, it is seen that Cronbach's α and McDonald's Ω coefficients provide evidence that the scale produces reliable results.

Discussion

In the study conducted to reveal the feedback of teachers in inclusive classrooms, it was concluded that the feedback given by teachers differed in terms of type, clarity, depth, focus and delivery. It was concluded that students with LD who evaluated the feedback of their teachers received feedback under these five headings. Teachers' Feedback Awareness Scale in Inclusive Classrooms (TFASIC) proved to be a measurement tool that produces valid and reliable results. Considering the qualitative findings, it can be said that the themes are the scope of the study, the sub-themes are the indicators of this scope, and the scale prepared afterwards are the items expressing these indicators. When the scope of the study - in other words, the themes - are analyzed, it is seen that they are gathered in five categories. These categories are emphasized in different studies and in a single study (Woods, 2015) it is stated that it has a non-linear structure. The parts that overlap with this study are that only one scope is not sufficient for feedback, all scopes are necessary and can affect each other. The parts that do not overlap are the characteristics of the participants, the handling of a specific discipline such as mathematics education and methodology.

The study conducted by Woods (2015) is a phenomenological study and was carried out with university lecturers and adult learners. Woods' (2015) study, which is supported by adult learning theory and feedback theory, shows that although the participant group is different, the scope is the same and the indicators are different. For example: in this context, while the 'indicator' in Woods' (2015) study includes providing individualized feedback in improving students' feedback, the 'indicator' for this study is that the feedback depends on the student with LD feature, both 'indicators' are indicators of the type of feedback. In other words, the characteristics of the person to whom the feedback is given is an indicator of the type of feedback given and is important for the feedback given when teaching mathematics in inclusive classrooms. Another indicator of the type of feedback is that it supports the self-regulation of inclusive students. This result is consistent with other studies (Graham et al., 2013; Ness & Middleton, 2012; Wery & Nietfeld, 2010).

Another indicator is that the feedback is encouraging, which is consistent with the study conducted by Nicol and Macfarlane-Dick (2006) in that the feedback is encouraging. Another indicator of this type is the use of resources outside the curriculum. This benefit is consistent with the emphasis in some studies (Värlander, 2008; Yorke, 2003) that feedback should be both formal and informal. In this study, formal feedback was not emphasized by the participants. This can be explained by the fact that the national curriculum and resources are not functional for students in inclusive classes. Therefore, it is necessary for both national programs and individual education programs developed for students with LD to include indicators related to feedback. Van den Bergh et al. (2013) categorized the types of feedback teachers use in the classroom as focus, goal-oriented, quality, method, adaptability and teacher skills. In their study, they concluded that feedback is generally task-oriented and there is very little association with the goals. This result does not coincide with the result of this study. Because in inclusive classes, it is articulated by both teachers and students that feedback is associated with the goal. This can be associated with the need to clearly state the goal for concretization in mathematics teaching. Although the TFASIC was expected to be five factors based on qualitative findings due to its basis in the literature on feedback studies (Berner et al., 2022; Chin, 2006; Hu et al., 2021; Kim et al., 2019; Truxaw, 2020; Woods, 2015), it produced valid and reliable results as a single-factor scale. The reason for expecting five factors is that five themes were formed as a result of the analysis of data collected from teachers in inclusive classes and students with LD.

These five themes have been asserted in separate studies and appear as a single dimension for this study. When feedback scales prepared for teachers (Bas & Xu, 2024; Burnett, 2002; Kara et al., 2018; Özkale, 2023) are examined, it is seen that these scales are associated with different tools (such as homework, written, oral) and serve different disciplines (science, mathematics, grammar). When the scales prepared for teachers in inclusive classes are examined, it is seen that they are made for different disciplines and different working groups - teacher candidates - and that feedback is associated only with teacher competence (Keppens et al., 2019; Sharma et al., 2012). In other words, there is no scale in literature that determines the awareness of teachers in

inclusive classes regarding their feedback. Therefore, TFASIC, which produces valid and reliable results as a single factor, will contribute to the literature. Future studies can include exploring the relationships between the developed scale and other variables such as teachers' beliefs and self-efficacy in teaching mathematics in inclusive classrooms. In addition, future studies can question the relationship between the practices and behaviors of teachers in inclusive classrooms. This will help develop a comprehensive understanding of teachers' competencies in inclusive education and mathematics teaching.

CONCLUSION

This study aimed to explore teachers' feedback practices in inclusive mathematics classrooms and to develop a valid and reliable scale measuring teachers' feedback awareness. The findings demonstrate that feedback in inclusive settings operates across five interconnected dimensions: type, clarity, depth, focus, and delivery. Both teachers and students with learning disabilities perceive feedback within this multidimensional structure. Qualitative findings indicate that effective feedback in inclusive classrooms is process-oriented, clearly articulated, emotionally supportive, and adapted to students' characteristics. The results highlight that feedback for students with LD requires not only pedagogical precision but also sensitivity to cognitive and affective needs. Quantitatively, the Teachers' Feedback Awareness Scale in Inclusive Classrooms (TFASIC) demonstrated strong psychometric properties. Although developed based on five conceptual themes, the scale revealed a robust single-factor structure, suggesting that teachers conceptualize feedback awareness as a unified construct. The study contributes to the field by 1) Extending feedback theory into inclusive mathematics education; 2) Bridging qualitative insight with quantitative validation; 3) Providing a context-specific instrument for measuring teacher feedback awareness. Future research should examine how teachers' feedback awareness relates to classroom practices, student achievement, and teachers' self-efficacy in inclusive mathematics education. Longitudinal studies could further explore how feedback awareness evolves with professional development and experience.

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