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Mathematics teachers' self-evaluation of equity-oriented teaching practices

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Abstract

Equity in mathematics education has evolved beyond ensuring equal access to learning opportunities to encompass fairness in addressing students' diverse educational, social, cultural, and linguistic needs. Within the context of elementary mathematics education in Saudi Arabia, this study investigated teachers' self-reported instructional practices through a multidimensional lens of mathematical equity. A convergent parallel mixed-methods design was employed, with quantitative data collected through an online questionnaire from 131 elementary mathematics teachers and qualitative data obtained from semi-structured interviews with 12 purposively selected participants. The quantitative and qualitative datasets were analyzed independently and subsequently brought together at the interpretation stage. The findings indicated that teachers generally evaluated their equity-oriented practices positively. Cultural and linguistic equity received the highest mean score, whereas equity in access to instructional resources received the lowest, although all five dimensions were rated at a high level. The qualitative findings illustrated teachers' reported use of diverse resources and instructional, participation, assessment, and language-support practices, while also showing areas that received less explicit attention, such as systematic monitoring of instructional bias and review of cultural or linguistic bias in educational resources. The findings contribute context-specific evidence on teachers' self-evaluations of equity-oriented mathematics teaching and highlight the need for further research using classroom observations and students' perspectives.

Keywords:
Elementary education, Mathematical equity, Mathematics teaching practices, Mixed-methods study, Saudi Arabia, Teacher self-evaluation

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1. INTRODUCTION

In contemporary educational discourse, equity has transcended its traditional interpretation of formal equality to embody a profound commitment to fairness by ensuring that all students receive the support they need to participate and succeed in mathematics learning. Within mathematics education, this shift necessitates moving beyond providing identical resources to all students toward allocating support based on individual needs, thereby ensuring robust learning opportunities for every learner regardless of their cultural, linguistic, or socioeconomic backgrounds (Berry & Wickett, 2009; NCTM, 2000). The National Council of Teachers of Mathematics (NCTM) has consistently emphasized this principle, asserting in Principles and Standards for School Mathematics (NCTM, 2000) that equity requires high expectations and strong support for all students. Subsequent NCTM publications further strengthened this perspective. Consequently, equity has evolved from a resource-focused concept into a pedagogical principle that guides teachers' instructional decisions and supports meaningful learning for all students.

Globally, the Organization for Economic Co-operation and Development (OECD) identifies equity as a key characteristic of high-performing educational systems. Systems that prioritize equity-oriented policies tend to demonstrate fewer disparities in students' achievement and higher overall educational outcomes (Education & Training Evaluation Commission (Kingdom of Saudi Arabia), 2021; OECD, 2023, 2025). This perspective recognizes that students' opportunities to learn mathematics are shaped by language, culture, classroom interactions, and broader social contexts (Nguyen, 2024; Risdiyanti & Prahmana, 2021). Given that mathematics often reveals educational disparities (Nieminen et al., 2024), achieving equity is therefore regarded as both a pedagogical and an ethical imperative, particularly in educational systems seeking to improve students' learning opportunities and outcomes.

To operationalize equity in mathematics education, Gutiérrez (2012) identified four interrelated dimensions: access, achievement, identity, and power. NCTM publications similarly emphasize equitable access to meaningful mathematics, high expectations, participation, and support for all learners. Building on these perspectives and on subsequent work on culturally responsive and equity-oriented teaching, the present study operationalized equity through five practice-oriented dimensions: equity in access to educational resources, equity in teaching practices, equity in participation and classroom interaction, equity in evaluation and learning support, and cultural and linguistic equity. These dimensions translate the broader equity framework into observable areas of teachers reported instructional practice while recognizing that the study measures teachers' perceptions and self-evaluations rather than directly observed enactment.

Central to realizing these theoretical ideals is the classroom teacher. Recent literature suggests that equity is not merely a product of policy or curriculum but is enacted through teachers' daily pedagogical decisions. An equitable teacher employs asset-based approaches, viewing students' languages and cultures as intellectual resources rather than deficits (NCTM, 2020). This aligns with culturally responsive teaching, which integrates students' funds of knowledge into mathematical inquiry (Shahrill et al., 2018; Suh et al., 2024). Effective practices include the use of open, multi-solution tasks, cooperative learning structures, and

formative assessment to promote meaningful participation, support diverse learners, and foster productive mathematical discourse (Gartland et al., 2022; Joseph, 2013; Meaney & Rangnes, 2024). In addition, a teacher's capacity for professional noticing, attending to, interpreting, and responding to students' mathematical thinking and learning needs, is increasingly recognized as a critical component of equitable mathematics teaching (Lestari et al., 2023; Mason, 2002; Roberts & Almeida, 2023).

Conversely, the absence of equity is often perpetuated by deficit-based practices, such as low expectations, rigid student grouping, and an over-reliance on standardized testing (Abtahi & Planas, 2024; Panthi et al., 2018; Rubel & Meyer, 2005). Yi et al. (2024) argue that equity is a dynamic process that can be undermined by seemingly "neutral" practices that fail to recognize students' diverse cultural and educational backgrounds. Such practices may unintentionally limit students' opportunities to participate and succeed in mathematics learning, highlighting the importance of teachers' awareness of equity in their instructional decisions. Implicit biases and structural constraints can further marginalize particular groups of students, emphasizing the need for sustained professional development (Darragh et al., 2026; Prahmana & Suwasti, 2014; Valoyes-Chávez & Darragh, 2024). Evidence from international educational systems suggests that reforms emphasizing responsive instruction and formative assessment can contribute to reducing educational disparities (OECD, 2021, 2025; Qiu & Leung, 2022; Vithal et al., 2024). These international findings provide a useful perspective for examining equity within national educational contexts, including Saudi Arabia.

Within the Saudi Arabian educational context, recent educational reforms have placed increasing emphasis on equity as a key component of quality education. The Vision 2030 reform agenda has centered educational equity as a pillar of quality assurance, emphasizing curriculum development and professional training (Alshalhoub et al., 2021). However, international assessments such as TIMSS 2019 and PISA 2022 continue to reveal persistent achievement gaps among students, which have been attributed to contextual factors such as curriculum pressures, insufficient training in equitable instructional strategies, and variations in school environments (Education & Training Evaluation Commission (Kingdom of Saudi Arabia), 2021; OECD, 2023). These findings suggest that, despite ongoing national reforms, promoting equitable mathematics teaching remains an important educational challenge. While teachers may theoretically value equity, its implementation in everyday classroom practice is often hampered by time constraints, instructional demands, and institutional expectations (Alibraheim, 2025).

Despite the growing international literature on equity-oriented mathematics teaching, less attention has been given to teachers' self-evaluations of multiple equity dimensions within a single practice-oriented framework, particularly in the Saudi Arabian elementary-school context. Existing work includes equity-oriented mathematics teaching frameworks, classroom observation approaches such as EQUIP/equity analytics, culturally responsive teaching self-efficacy measures, and studies of equity and social justice in mathematics education. The contribution of the present study is therefore not to claim a lack of research on equity enactment in general, but to provide context-specific evidence on how elementary mathematics teachers evaluate their own reported practices across five dimensions and how these self-evaluations relate to their interview accounts.

1.1. Previous Studies

Recent research on equity in mathematics education has examined how teachers understand, enact, and develop practices that support equitable learning opportunities across diverse educational contexts. Existing studies have examined equity from different perspectives, including teachers' understandings, beliefs, and instructional practices related to creating more equitable mathematics classrooms. Several studies have explored how teachers conceptualize equity and social justice in mathematics education. Pourdavood and Yan (2022) found that engaging trainee mathematics and science teachers with social equity principles enhanced their awareness of educational opportunities and highlighted the need for changes in instructional practices. Similarly, Panthi et al. (2018) identified several dimensions underlying teachers' perceptions of social equity, including equality, justice, equity, social processes, and student care. Extending this line of research, Rizwan and Ali (2024) examined teacher trainers' perspectives on social equity and revealed that equity was understood through interconnected aspects of equality, justice, relationships, differences, and professional responsibility, suggesting that teachers' understandings of equity are multidimensional rather than limited to equal treatment.

Other studies have focused on preparing mathematics teachers to enact equity-oriented practices. Olawale (2025) emphasized the importance of culturally relevant teaching experiences and community engagement in preparing teachers to address students' diverse needs. Likewise, Litke et al. (2025) proposed a professional learning model that supported mathematics teacher educators in developing equitable teaching practices through reflection, analysis of classroom practices, and gradual instructional improvement.

In addition to examining teachers' understandings and professional preparation, recent research has investigated factors associated with teachers' equity-oriented beliefs and practices. Jiang et al. (2026) examined the relationship between teachers' perceptions of inclusive teaching practices and their attitudes toward social equity, revealing a positive association between inclusive practices and equity-related attitudes. Similarly, Koutsovasili et al. (2024) investigated factors associated with teachers' attitudes toward social equity and self-efficacy for implementing equitable practices, suggesting that teachers' demographic and professional characteristics may contribute to variations in equity-related awareness and practices.

Collectively, previous studies indicate that equity in mathematics education has been examined from multiple perspectives, including teachers' conceptions, equity-oriented instructional practices, professional learning, and factors associated with teachers' beliefs. However, much of the existing research has focused on specific aspects of equity, such as teachers' perceptions or professional development, rather than examining multiple dimensions of equity within a single framework. Furthermore, relatively less attention has been given to how elementary mathematics teachers evaluate their own equity-oriented practices, particularly within the Saudi Arabian educational context.

Therefore, the current study addresses this gap by examining elementary mathematics teachers' self-evaluations of their reported teaching practices across multiple equity dimensions in the Saudi Arabian context. The mixed-methods design provides an opportunity to compare independently analyzed questionnaire and interview evidence and to identify

convergence, complementarity, and divergence between teachers' ratings and their descriptions of practice.

1.2. Statement of the Problem

Despite the theoretical and institutional progress on adopting the concept of educational equity in the Kingdom of Saudi Arabia, there remains a need to better understand the extent to which equity-oriented principles are reflected in everyday mathematics classroom practices. Several classroom practices may still reflect formal equality rather than equity, such as providing the same content and support to all students without sufficiently considering their individual, linguistic, or cultural differences. Other practices may involve excessive reliance on standardized assessments without providing adequate formative support for learning (OECD, 2023; Panthi et al., 2018).

The problem is also highlighted by contextual and institutional challenges, including the pressure of unified curricula that may restrict teachers' flexibility in adapting content according to students' needs. Additionally, the problem is evident in the need for specialized professional training in equitable teaching strategies and stronger institutional support mechanisms that encourage innovation and inclusive practices. Besides, social and economic disparities continue to influence students' achievement and learning opportunities, making equity in mathematics education a complex challenge that requires deeper understanding of classroom and organizational factors (OECD, 2023).

Teaching mathematics in the context of equity requires ongoing efforts to translate theoretical principles into classroom practices, particularly in contexts where equity-oriented approaches are still developing (Pourdavood & Yan, 2022). Panthi et al. (2018) highlighted variations in teachers' interpretations of social equity, whereas Rizwan and Ali (2024) emphasized the influence of teachers' understandings of equity on their instructional approaches and the importance of professional preparation to address related challenges. Furthermore, Rosa and Orey (2023) emphasized the need for instructional approaches that effectively respond to students' diverse linguistic and cultural backgrounds. Similarly, Jiang et al. (2026) highlighted the importance of addressing learners' needs through inclusive and equity-oriented teaching practices. Regarding methodological approaches in equity research, Nugraha and Nugraha (2025) emphasized the value of qualitative inquiry and interviews for exploring issues related to cultural diversity.

In addition to the existing literature, limited research attention has been given to examining equity in mathematics classrooms within the Saudi Arabian educational context, particularly from teachers' perspectives and across multiple dimensions of equity. Therefore, further investigation is needed to understand how mathematics teachers perceive and evaluate their equity-oriented teaching practices and the challenges associated with implementing such practices.

Accordingly, the research problem lies in the need to examine elementary mathematics teachers' self-evaluations of their reported teaching practices in relation to multiple mathematical equity dimensions within the Kingdom of Saudi Arabia. Specifically, the study focuses on access to resources, teaching practices, participation and interaction, evaluation and

learning support, and cultural and linguistic equity, while recognizing that the findings represent teachers' reports rather than direct observations of classroom practice.

1.3. Research Questions

Based on the research problem and objectives, the current study seeks to answer the following questions: (1) What are elementary mathematics teachers' self-evaluations of their teaching practices based on the principles of mathematical equity in the Kingdom of Saudi Arabia? (2) Are there statistically significant differences at the significance level ($\alpha \leq 0.05$) in elementary mathematics teachers' self-evaluations of equity-oriented teaching practices based on gender and teaching experience? and (3) How do mathematics teachers describe their equity-oriented teaching practices in elementary mathematics classrooms?

2. METHOD

The topic of equity in mathematics education has received increasing attention internationally; however, research examining equity-oriented teaching practices remains limited in some educational contexts, including Arab contexts. As the current study aims at exploring elementary mathematics teachers' self-evaluations of their equity-oriented teaching practices, deeper investigation is required to understand teachers' perspectives and the factors shaping these practices. Therefore, the current study adopted a mixed-methods approach, which integrates quantitative and qualitative data to develop a more comprehensive understanding of the research problem (Creswell, 2014).

Quantitative data were collected using a descriptive survey approach to examine teachers' self-reported practices across different dimensions of mathematical equity. In parallel, qualitative data were collected through semi-structured interviews addressing the same teaching-practice dimensions. Following Creswell and Creswell (2018), the study used a convergent parallel mixed-methods design: the quantitative and qualitative datasets were analyzed independently, and neither analysis was based on the findings of the other. The two strands were subsequently brought together during interpretation to identify areas of convergence, complementarity, and divergence.

2.1. Population and Sample

The population of the study consisted of 2,032 elementary mathematics teachers in public schools in the Eastern Province of the Kingdom of Saudi Arabia, including 582 male teachers and 1,450 female teachers. The quantitative sample consisted of 131 teachers who responded to the online questionnaire. Thus, the achieved quantitative sample represents voluntary responses to the distributed instrument rather than a probability-selected sample. This distinction is important when interpreting the generalizability of the findings.

a. Quantitative sample

The quantitative sample consisted of 131 male and female mathematics teachers who responded to the online questionnaire. Participation was voluntary, and the sample therefore reflects teachers who chose to respond to the instrument. The participants represented different demographic characteristics, including gender, qualification, teaching experience, and

professional rank. Table 1 presents the distribution of the participants according to these variables.

Table 1. Distribution of the quantitative sample according to demographic variables

Variable	Category	Frequency	Percentage %
Gender	Female	79	60.3
	Male	52	39.7
Qualification	Bachelor's	122	93.1
	Master's or Higher	9	6.9
Experience	1 year to less than 10 years	38	29.0
	10 years or more	93	71.0
Teacher Rank	Practitioner	108	82.4
	Advanced	19	14.5
	Expert	4	3.1

In the Saudi Arabian educational system, professional rank refers to the classification system used for teachers, which includes Practitioner, Advanced, and Expert levels based on professional development requirements and career progression.

b. Participants in the qualitative study

For the qualitative component, 12 teachers who had previously completed the questionnaire were purposively selected to participate in semi-structured interviews. Participants were selected to ensure variation in gender, teaching experience, qualification, and professional rank. This purposive selection aimed to capture diverse perspectives and provide deeper insights into teachers' understandings and practices related to mathematical equity. Table 2 describes the participants in the qualitative study.

Table 2. Participants in the qualitative study

Teacher Code	Gender	Experience	Rank	Qualification
T1	Female	15	Practitioner	Bachelor
T2	Female	22	Practitioner	Bachelor
T3	Male	14	Advanced	Master
T4	Female	14	Practitioner	Bachelor
T5	Male	11	Practitioner	Bachelor
T6	Female	3	Practitioner	Master
T7	Female	7	Expert	Master
T8	Female	18	Practitioner	Bachelor
T9	Female	6	Advanced	Bachelor
T10	Female	5	Practitioner	Bachelor
T11	Female	9	Advanced	Ph.D.
T12	Male	8	Practitioner	Bachelor

2.2. Instruments of the Study

As the current study adopted a mixed-methods approach, two complementary research instruments were employed to examine elementary mathematics teachers' self-evaluations of equity-oriented teaching practices and to gain deeper insights into their perspectives. These instruments included a questionnaire for collecting quantitative data and a semi-structured interview for collecting qualitative data. These tools are as follows:

a. Gathering quantitative data

To collect quantitative data, an online questionnaire was constructed specifically for the present study. It was not adapted from or developed from a previously published questionnaire. The questionnaire consisted of two sections: the first section included demographic information, whereas the second section addressed five dimensions of mathematical equity. Item development was informed by relevant literature and conceptual frameworks, including publications by NCTM (2014, 2020) and Gutiérrez (2012). It consisted of 23 items distributed across five dimensions: equity in access to educational resources, equity in teaching practices, equity in participation and classroom interaction, equity in evaluation and learning support, and cultural and linguistic equity.

The questionnaire was developed through several stages, including reviewing the relevant literature, generating an initial pool of items, and conducting multiple rounds of revision by the research team. The preliminary version was reviewed by experts in mathematics education and experienced mathematics teachers to evaluate the clarity, relevance, and suitability of the items for the target context. The questionnaire was reviewed by 11 experts, and their feedback was used to refine the clarity, relevance, and suitability of the items before the questionnaire was finalized. No separate pilot study was conducted before the main administration. The reliability of the questionnaire was assessed using Cronbach's alpha. The overall reliability coefficient was 0.92, while the reliability coefficients for the five dimensions were 0.72, 0.79, 0.70, 0.91, and 0.86, respectively. The coefficients of 0.70 and 0.72 are modest and should therefore be interpreted as acceptable but warranting caution. The present study did not report EFA or CFA; accordingly, construct validity should not be claimed beyond the content-validation procedures actually conducted.

To support consistent interpretation of the questionnaire items, each teaching practice was accompanied by behavioral descriptions representing different levels of reported practice. These descriptions were intended to clarify the meaning of each response category and assist participants in evaluating their own practices.

The behavioral descriptions provided in Table 3 were used to clarify the response categories and support participants' understanding of the rating scale.

Table 3. An example of behavioral descriptions representing levels of self-reported practice

Teaching Practice	High Level of Reported Practice	Medium Level of Reported Practice	Low Level of Reported Practice	Very Low Level of Reported Practice
I continuously review educational materials to avoid any cultural or linguistic bias.	I regularly review educational materials to ensure they are free from any cultural or linguistic bias that may affect equity among students.	I sometimes review educational materials to explore cases of bias, but the review may not always be comprehensive.	I rarely review educational materials; this allows some instances of cultural or linguistic bias go unaddressed.	I never review educational materials to ensure they are free from any cultural or linguistic bias.

The response values were distributed into four levels, as shown in Table 4.

Table 4. Distribution of categories according to the scale

Tool	Grade of Response	Level of Response	Range of Means
Questionnaire	1	Very Low	$1.00 \leq \text{Means} \leq 1.75$
	2	Low	$1.75 < \text{Means} \leq 2.50$
	3	Medium	$2.50 < \text{Means} \leq 3.25$
	4	High	$3.25 < \text{Means} \leq 4.00$

b. Gathering qualitative data

To gather qualitative data, semi-structured interviews were conducted with selected participants to explore their perspectives and reported practices regarding the same five dimensions addressed by the questionnaire. The protocol was designed to maintain alignment with the quantitative instrument while allowing participants to provide detailed examples and reflections. The five guiding questions were: (1) How do you understand equity in mathematics teaching and learning? (2) What practices do you use to provide equitable access to educational resources? (3) How do you adapt mathematics teaching to students' levels, needs, and differences? (4) How do you promote equitable participation and classroom interaction? (5) How do you address equity in assessment, learning support, and cultural and linguistic aspects of mathematics teaching? The interviews were conducted in Arabic, the same language in which the questionnaire was administered. The interviews were not audio-recorded; instead, participants' responses were manually documented and transcribed. Any quotations presented in English in this manuscript were translated from Arabic solely for the purpose of publication (see Figure 1).

The fourth dimension: Teaching practices in light of equity in evaluation and learning support
Describe the assessment practices you use in your mathematics classroom. How do you consider issues related to fairness and equity when evaluating students' learning? Can you provide a specific example?

Figure 1. Sample of interview instrument

2.3. Ethical Considerations

Before conducting the interviews, teachers were contacted to obtain their consent to participate, and participants in both the questionnaire and the interviews were informed about the purpose of the study. Participation was voluntary, and all participants were informed of their right to withdraw from the study at any time without consequences. The objectives of the study were clarified, and participants were given the freedom to identify an appropriate time and method for the interview. Responses were treated confidentially and anonymously for research purposes only. No formal institutional ethics committee approval was obtained for this study. However, informed consent was obtained from the interview participants, who agreed voluntarily and fully to participate after the purpose and procedures of the interviews had been explained. Participants' identities were protected through the use of pseudonyms, and the information collected was used solely for research purposes. The interviews were conducted through face-to-face and telephone modes, and participants were also given the option of responding to the interview questions in writing when preferred. The interviews lasted approximately 30–40 minutes.

2.4. Study Context

This study was conducted in the context of elementary education in the Kingdom of Saudi Arabia, where elementary education extends from Grade 1 to Grade 6 and mathematics is taught by specialized mathematics teachers in public schools. The study focused on the Eastern Province, a context that should not be treated as demographically or institutionally homogeneous. Differences in students' socioeconomic circumstances, linguistic backgrounds, and access to school resources may shape opportunities to learn mathematics. Because the present study did not collect student demographic or school-infrastructure data, these contextual characteristics are considered interpretive possibilities rather than direct explanations of the findings.

2.5. Reliability of Qualitative Data

The trustworthiness of the qualitative data was considered through attention to credibility, dependability, and confirmability. Credibility was supported by aligning the interview protocol with the study questions and the five questionnaire dimensions, purposively selecting participants with variation in gender, teaching experience, qualifications, and professional rank, and using representative quotations to ground interpretations. Dependability and confirmability were supported by documenting the research context, participants, instruments, and analytic procedures. The qualitative coding was conducted by the final researcher. Because a single researcher conducted the coding, inter-coder agreement and procedures for resolving disagreements between coders were not applicable.

2.6. Data Analysis

Quantitative data were analyzed using the Statistical Package for the Social Sciences (SPSS). Descriptive statistics, including means and standard deviations, were calculated to describe teachers' self-reported equity-oriented teaching practices across the five dimensions. For the comparisons by gender and teaching experience, the original total scores were converted to item-mean scores (total score divided by 23) to facilitate interpretation on the 1–4 response scale. Because the comparison groups were unequal in size and showed somewhat different standard deviations, Welch's independent-samples t-test was used as a conservative comparison. Cohen's d and 95% confidence intervals for the mean differences are also reported. The experience grouping (less than 10 years versus 10 years or more) is retained to correspond to the original analysis; however, this dichotomization reduces information and is acknowledged as a methodological limitation. The significance level was set consistently at $\alpha \leq 0.05$.

Qualitative interview data were analyzed using qualitative content analysis. The interview transcripts were read repeatedly and organized in relation to the five dimensions of mathematical equity that guided the questionnaire. Meaningful statements were identified and grouped into themes and illustrative practices within each dimension. The coding was conducted manually by the final researcher without the use of qualitative analysis software. The analysis was guided by the five dimensions used in the study, while the grouping of meaningful statements into themes allowed participants' reported meanings and examples to remain central to interpretation. Because there was one coder, no inter-coder disagreements required resolution. The qualitative results are presented primarily through themes, meanings, and representative quotations rather than treating frequencies from the 12 participants as statistically representative.

Consistent with the convergent parallel mixed-methods design, the quantitative and qualitative datasets were analyzed independently. Integration occurred at the interpretation stage through comparison of findings addressing the same five teaching-practice dimensions. The integration therefore identifies areas of convergence, complementarity, and divergence without implying that one strand of analysis generated or determined the other.

3. RESULTS AND DISCUSSION

3.1. Results

The results are presented according to the three research questions. The quantitative and qualitative findings are first reported from their independent analyses, followed by an explicit joint display showing how the two strands converge, complement, or diverge. This organization reflects the convergent parallel mixed-methods design while preserving the independence of the two analyses.

> *Answering the first question: What are elementary mathematics teachers' self-evaluations of their teaching practices based on the principles of mathematical equity in the Kingdom of Saudi Arabia?*

To answer the main question, the results of each principle will be presented independently by calculating means and standard deviations and identifying the performance level, as follows.

3.1.1. First dimension: Equity in Access to Resources

Table 5 demonstrates that the overall mean for the dimension was 3.40. According to the predefined interpretation of the four-point scale (see Table 4), this mean falls within the high-performance level. Slight variation was observed in the mean scores across the teaching practices. Although all practices were rated at a high level, the highest mean was reported for the practice "*I am keen to provide digital or printed alternatives...*", whereas the practices related to providing additional support time and sharing open educational resources received comparatively lower mean scores.

Table 5. Means, standard deviations, and performance level for equity in access to resources

Teaching Practice	Means	Standard Deviation	Performance Level
I am keen to provide digital or printed alternatives for students who face difficulties with access to resources.	3.53	0.64	High
I give regular additional support times to all students to provide equal learning opportunities.	3.29	0.78	High
I share open and free educational resources with students to enhance equity opportunities in access to knowledge.	3.29	0.93	High
I am keen to facilitate all students' access to necessary tools and educational materials.	3.51	0.68	High
I help students overcome technical or linguistic obstacles that may hinder their utilization of available educational resources	3.39	0.91	High
Overall Mean for the Dimension	**3.40**	**0.58**	**High**

3.1.2. Second dimension: Equity in Teaching Practices

As shown in Table 6, the overall mean for the dimension reached 3.62. this mean falls within the high-performance level. Although all practices were rated at a high level, slight variation was observed across the items. The teaching practice "*I vary the methods of explaining mathematical concepts (visual, verbal, or symbolic) to provide equitable learning opportunities for all students*" received the highest mean score, while the teaching practice "*I continuously monitor indicators of bias in teaching and strive to address them in ways that enhance equity*" received the comparatively lowest mean score.

Table 6. Means, standard deviations, and performance level for equity in teaching practices

Teaching Practice	Means	Standard Deviation	Performance Level
I vary the methods of explaining mathematical concepts (visual, verbal, and symbolic) to provide equitable learning opportunities for all students.	3.69	0.47	High
I structure mathematics lessons according to students' levels (differentiation/ individualization) to ensure consideration of individual differences.	3.62	0.54	High
I use active learning strategies that give all students equal opportunities for understanding and participation.	3.65	0.62	High
I continuously monitor indicators of bias in teaching and strive to address them in ways that enhance equity.	3.54	0.69	High
Overall Mean for the Dimension	**3.62**	**0.47**	**High**

3.1.3. Third Dimension: Equity in Participation and Interaction

Table 7 clarifies that the overall mean for the dimension reached 3.64, meaning that the performance level can be categorized in the high range. Variation in the means of the dimension's teaching practices has also been observed. The teaching practice (I strive to create a safe classroom climate that is based on respecting opinions and appreciating diversity) was marked as having the highest means whereas the teaching practice (I design balanced and cooperative roles within groups in a way that enhances equitable participation) achieved the lowest.

Table 7. Means, standard deviations, and performance level for equity in participation and interaction

Teaching Practice	Means	Standard Deviation	Performance Level
I use strategies that ensure an equitable distribution of questions among students.	3.64	0.55	High
I design balanced and cooperative roles within groups in a way that enhances equitable participation.	3.57	0.63	High
I strive to create a safe classroom climate that is based on respecting opinions and appreciating diversity.	3.68	0.58	High
I follow and motivate shy students to ensure their equitable participation in classroom activities.	3.65	0.60	High
Overall Mean for the Dimension	**3.64**	**0.48**	**High**

3.1.4. Fourth Dimension: Equity in Evaluation and Learning Support

Table 8 demonstrates that the overall mean for the dimension reached 3.65, indicating that the performance level achieved a high level. The table has also shown inequality in the means of the dimension's teaching practices. The teaching practice (I consider students' social and economic circumstances when assigning classroom tasks and extracurricular activities)

recorded the highest means whereas the teaching practice (I provide constructive and timely feedback to support the learning of all students) recorded the lowest means.

Table 8. Means, standard deviations, and performance level for equity in evaluation and learning support

Teaching Practice	Means	Standard Deviation	Performance Level
I employ diverse assessment tools (tests, practical performance, projects, portfolios) to accommodate different learning styles.	3.70	0.51	High
I ensure that criteria of evaluation are clearly shared with students before beginning a task to guarantee transparency and equity.	3.66	0.56	High
I provide constructive and timely feedback to support the learning of all students.	3.57	0.74	High
I offer opportunities for students to attempt again or improve their performance, whenever possible, to promote equity in learning.	3.65	0.62	High
To ensure equity, I consider individual differences when assigning homework to students.	3.61	0.67	High
I consider students' social and economic circumstances when assigning classroom tasks and extracurricular activities.	3.74	0.52	High
Overall Mean for the Dimension	**3.65**	**0.48**	**High**

3.1.5. Fifth Dimension: Cultural and Linguistic Equity

As indicated in Table 9, the overall mean for the dimension reached 3.69; this means that the performance level falls within high range. It is also observed that there is variation in the means of the dimension's teaching practices. The teaching practice (I simplify mathematical language and explain terminology to ensure clarity for all students) recorded the highest means, while the teaching practice (I provide reasonable accommodations for students with difficulties, such as extra time or alternative formats to support their equitable participation) recorded the lowest means.

Table 9. Means, standard deviations, and performance level for cultural and linguistic equity

Teaching Practice	Means	Standard Deviation	Performance Level
I simplify mathematical language and explain terminology to ensure clarity for all students.	3.74	0.53	High
I select contextual examples that are close to the students' environment and daily experiences to enhance equity and understanding among them.	3.73	0.51	High
I provide reasonable accommodations for students with difficulties (such as extra time or alternative formats) to support their equitable participation.	3.64	0.56	High
I regularly review educational materials to avoid any cultural or linguistic bias.	3.65	0.64	High
Overall Mean for the Dimension	**3.69**	**0.47**	**High**

Overall, teachers reported a high level of equity-oriented teaching practices (M = 3.60 on a 1–4 scale). Cultural and Linguistic Equity obtained the highest mean score (M = 3.69), whereas Equity in Access to Resources received the lowest (M = 3.40). Nevertheless, all five dimensions were rated within the high range. Because these are self-evaluations, the high scores may partly reflect social desirability or teachers' tendency to report practices consistent with professionally valued expectations; therefore, they should not be interpreted as direct evidence of actual classroom enactment.

Answering the second question: Are there statistically significant differences in elementary mathematics teachers' self-evaluations of equity-oriented teaching practices according to gender and teaching experience?

To answer the second research question, the null hypothesis was tested at $\alpha \leq 0.05$. Independent-samples comparisons were conducted using Welch's t-test to account for unequal group sizes and potential differences in group variances. The results are reported as item-mean scores on the original 1–4 scale, together with Cohen's d and 95% confidence intervals for the mean differences.

The findings in Table 10 reveal no statistically significant difference in teachers' self-evaluations by gender (Welch's t = 1.74, p = 0.085, Cohen's d = 0.31, 95% CI for the difference in item-mean scores = −0.02 to 0.29). Similarly, there was no statistically significant difference by teaching experience (Welch's t = 0.01, p = 0.996, Cohen's d ≈ 0.00, 95% CI = −0.15 to 0.15). The effect size for gender was small, whereas the effect size for teaching experience was negligible, indicating limited evidence of group differences in teachers' self-evaluations.

Table 10. Differences in mean item scores by gender and teaching experience

Variable	Category	N	Mean Item Score	SD Total Score	Welch's t	p	Cohen's d	95% CI for Mean Difference
Gender	Female	79	3.66	9.64	1.74	0.085	0.31	−0.02 to 0.29
	Male	52	3.52	10.33				
Teaching experience	1 to <10 years	38	3.60	8.58	0.01	0.996	≈ 0.00	−0.15 to 0.15
	10+ years	93	3.60	10.56				

To answer this question,

Answering the third question: How do mathematics teachers describe their equity-oriented teaching practices in elementary mathematics classrooms?

Several interviews have been conducted and analyzed, and the results are as follows. Multiple interviews were conducted with teachers representing diverse backgrounds in terms of gender, teaching experience, professional rank, and qualifications. This diversity enabled the researchers to obtain a broad range of perspectives regarding equitable mathematics teaching.

The interviews began by exploring participants' understanding of equity in mathematics teaching and learning. Participants commonly described equity in terms of

providing opportunities and support according to students' abilities, circumstances, and individual differences. T2 stated: "*equity means that students should not be deprived of their opportunity and right to understand due to the differences in their individual abilities, culture, or learning pace.*" T10 indicated that: "*equity in mathematics classrooms involves asking questions that are diverse in ease and difficulty and solution methods.*"

These accounts show a broad orientation toward differentiated support and opportunity; however, the responses did not systematically address all dimensions of Gutiérrez's (2012) framework, particularly identity and power. Therefore, the finding is interpreted as evidence of teachers' reported understanding rather than as evidence of a fully comprehensive conception of equity.

Following the discussion of participants' understanding of mathematical equity, the interviews focused on equity in access to educational resources. Participants emphasized the teacher's role in providing diverse resources such as textbooks, manipulatives, and technological applications according to students' abilities and learning needs. Importantly, the interviews did not identify substantial resource barriers or systematic lack of access. This contrasts with the quantitative result in which access received the lowest of the five-dimension means. The two strands therefore show a divergence: teachers rated resource equity relatively lower than other dimensions, while their interview accounts emphasized the resources, they reported using rather than barriers to resource availability as summarized in Table 11.

Table 11. Themes and illustrative practices for equity in access to resources

Theme	Illustrative Practices
Access to resources	Using textbooks, manipulatives, and technology; identifying learners' needs through grouping; considering learning styles and social/economic circumstances.

The access theme centered on teachers' reported use of multiple resources and on adapting resource use to learners' needs. T4 stated: "*I use different methods in presenting the lessons; for some lessons, I use a direct tool; for others I employ examples from the textbook; and in some other lessons, I depend on tangible teaching aids.*" T5 similarly described using stations with different representations during a place-value lesson. These accounts illustrate resource diversification and adaptation, while providing no direct evidence about structural availability of resources outside the classroom.

Then the interviews addressed equitable teaching practices in mathematics classrooms to ensure learning for all students. The participants presented a group of classrooms teaching practices, including varying teaching methods, considering students' levels and their individual differences, as well as giving students an opportunity to choose the appropriate technology presented in Table 12.

Table 12. Themes and illustrative practices for equity in classroom teaching practices

Theme	Illustrative Practices
Teaching practices	Varying teaching methods; responding to different levels and individual differences; selecting technology appropriately.

All participants described varying teaching methods as important for equitable learning, and many referred to considering students' individual differences. T11 stated: "*I consider students' levels and their different awarenesses; some students prefer examples from real life; others prefer technology-based activities.*" T7 also reported presenting several solution methods and allowing students to interact with approaches that suit them. At the same time, participants rarely described systematic monitoring of their own teaching for possible sources of bias. Thus, the qualitative evidence complements the high quantitative score while identifying a less explicit aspect of reflective equity practice.

Following the discussion of equity in teaching practices, the interviews focused on participation and classroom interaction. Participants described several practices they used to promote equitable participation in mathematics classrooms, as summarized in Table 13.

Table 13. Themes and illustrative practices for equity in participation and classroom interaction

Theme	Illustrative Practices
Participation	Distributing opportunities to participate; using random selection; providing sufficient explanation time; using groups/tasks; supporting shy students; considering individual differences.

The participation and interaction theme included distributing opportunities across students, using random selection, organizing cooperative groups, and supporting shy or hesitant students. The emphasis was on broadening participation rather than restricting opportunities to a small group of students.

This dimension showed convergence between the quantitative and qualitative strands regarding participation opportunities. T1 stated: "*Participation is not constricted on a particular number of students. One method I employ involves using cards with students' names for random student selection.*" T6 described supporting shy students by grouping them with a confident student. These accounts provide concrete examples of the participation practices represented in the quantitative dimension.

The interviews then explored teachers' equitable assessment and evaluation practices in mathematics classrooms. Participants described several practices related to assessment, including the use of diverse assessment methods, clear evaluation criteria, understandable language, and constructive feedback presented in Table 14.

Table 14. Themes and illustrative practices for equity in evaluation

Theme	Illustrative Practices
Evaluation	Using diverse assessment formats; applying clear standards; using clear and simple language; providing feedback.

The evaluation theme emphasized diversification of assessment tools, clarity of evaluation criteria, understandable language, and feedback. T9 stated: "*I am inclined to electronic evaluation I do my best to implement it. When I notice a student is not effectively engaged, I use other methods such as paper-based or technology-based.*" T3 similarly described evaluation as a developmental tool and reported using paper-based, electronic, oral, performance, and project-based assessments. The qualitative findings therefore complement

the quantitative emphasis on diversified assessment, although the interviews did not provide evidence that students were systematically given opportunities to correct wrong answers.

The final section of the interviews focused on cultural and linguistic equity in mathematics classrooms. Participants described several practices related to using clear language, connecting mathematics to students' daily lives, and supporting students with learning difficulties. The reported practices are summarized in Table 15.

Table 15. Themes and illustrative practices for linguistic and cultural equity

Theme	Illustrative Practices
Cultural and linguistic responsiveness	Using clear and simple language; connecting mathematics to students' daily lives; responding to learning difficulties.

The cultural and linguistic theme centered on clarity and simplicity of mathematical language, connections to students' daily lives, and support for learning difficulties. T8 described using clear language and practical measurement examples, while T5 emphasized experiments, images, and videos to address verbal explanations. These accounts converge with the high quantitative rating of the cultural and linguistic dimension. However, the interviews did not establish that teachers systematically reviewed instructional resources for cultural or linguistic bias; therefore, the high score should not be interpreted as evidence of comprehensive recognitional equity as summarized in Table 16.

Table 16. Joint display of quantitative and qualitative findings

Dimension	Quantitative Finding	Qualitative Theme/Evidence	Integrated Interpretation
Access to resources	M = 3.40; lowest dimension, but still high.	Use of textbooks, manipulatives, and technology; no systematic resource barriers reported.	Divergence: the survey indicates relatively lower perceived equity, whereas interviews emphasize resource use rather than barriers.
Teaching practices	M = 3.62; high.	Variation in teaching methods and attention to individual differences.	Convergence and complementarity: interview examples illustrate practices reflected in the high rating.
Participation and interaction	M = 3.64; high.	Random selection, distributing opportunities, cooperative groups, and support for shy students.	Convergence: interview accounts provide concrete examples of equitable participation.
Evaluation and learning support	M = 3.65; high.	Diversified assessment, clear criteria, and feedback.	Convergence with some qualification: interviews did not establish systematic opportunities for students to correct errors.
Cultural and linguistic equity	M = 3.69; highest dimension.	Clear/simple language, daily-life connections, and support for learning difficulties.	Convergence, but interpretation is cautious because student demographic diversity was not measured and resource-bias review was not reported.

3.2. Discussion

The findings indicate that teachers generally evaluated their equity-oriented teaching practices positively across the five dimensions. These self-evaluations suggest that teachers perceived themselves as promoting students' access, participation, responsiveness to individual differences, equitable evaluation, and cultural and linguistic inclusion. This orientation aligns with contemporary conceptions of equity in mathematics education, which emphasize meaningful opportunities to participate in and learn mathematics rather than equal treatment alone (Hendroanto et al., 2017; Subramanian et al., 2024). It also reflects calls for pedagogies that recognize learner diversity and address equity, diversity, and inclusion (Abtahi & Planas, 2024). However, these results represent teachers' perceptions rather than direct evidence of classroom enactment. Interview accounts of varied teaching and assessment approaches, attention to individual differences, participation opportunities, and clear mathematical language contextualize these perceptions and align with established principles of equitable mathematics teaching (NCTM, 2014).

Joint interpretation of the quantitative and qualitative findings reveals convergence across the teaching-practice, participation, evaluation, and cultural-linguistic dimensions. Positive survey ratings were broadly supported by teachers' accounts of their reported practices. However, this convergence does not establish their effectiveness or equity from students' perspectives. Equity-oriented teaching concerns not merely the strategies employed but also how these shape students' positioning, participation, and opportunities to engage in mathematical activity (Abtahi & Planas, 2024; Subramanian et al., 2024). The findings therefore indicate a reported orientation toward equity rather than demonstrating that equitable opportunities were consistently realized.

Access presents a more nuanced pattern. It received the lowest quantitative mean, yet interviewees primarily described available instructional resources without reporting systematic resource barriers. This divergence suggests that resource availability and equitable access to meaningful mathematical participation may represent different considerations. Access extends beyond the provision of materials to encompass power, identity, participation, and opportunities to engage meaningfully in mathematics (Gartland et al., 2022). Consequently, teachers' descriptions of available resources cannot establish that all students experience equitable access. The lower rating may reflect perceived limitations in ensuring such access, while interview accounts illustrate teachers' reported responses. This interpretation also aligns with asset-based approaches that recognize students' existing knowledge, experiences, identities, and resources rather than framing equity primarily in terms of deficits or shortages (Celedón-Pattichis et al., 2018).

The relatively high cultural-linguistic score also warrants caution. Because student demographic information was not collected, the study cannot establish the extent of linguistic, cultural, or socioeconomic diversity in participating classrooms. Although Arabic is the principal language of schooling, this does not imply homogeneous student experiences. Linguistic differences and language-mediated participation can shape access to mathematical meanings and classroom interaction (Nugraha & Nugraha, 2025). Accordingly, the score is better interpreted as evidence of teachers' reported attention to clarity, contextualization, and individual differences than as evidence of classroom homogeneity. Culturally responsive

mathematics education requires teachers to recognize and engage with students' diverse experiences rather than rely on singular cultural or linguistic categories (Keddie, 2012). Whether students actually experience such responsiveness remains an empirical question.

The absence of statistically significant differences by gender and teaching experience indicates that neither variable was associated with distinguishable levels of self-reported equity-oriented practice within this sample. This finding should not be attributed to shared professional training, curriculum structures, or institutional evaluation practices, as these explanations were not investigated. The qualitative findings further suggest that teachers did not consistently describe explicit self-monitoring or critical reflection on equity. This omission is noteworthy because equitable teaching requires attention to how participation and learning opportunities are distributed. Research on multidimensional teacher noticing emphasizes systematically identifying inequities in classroom interactions and learning opportunities (van Es et al., 2022), while responsive mathematics teaching highlights noticing and responding to students' mathematical thinking and participation (Alsina et al., 2026). The limited evidence of explicit self-monitoring therefore identifies a potential focus for professional learning, rather than necessarily indicating a lack of commitment to equity.

Several limitations should be considered when interpreting the findings. First, the study was conducted in the Eastern Province of Saudi Arabia and used a voluntary-response quantitative sample, which limits generalizability and may introduce self-selection bias. Second, the study relies on teachers' self-evaluations and interview accounts and did not include classroom observations or students' perspectives; consequently, the findings concern reported practices rather than directly observed enactment. This distinction is particularly important in equity research because commitments to equity may not necessarily translate consistently into classroom practice, and sustaining an equity focus requires attention to the complex conditions under which teachers interpret and enact equity (Crespo et al., 2022). Third, the newly developed questionnaire has strong overall internal consistency ($\alpha = 0.92$), but two dimensions showed relatively modest coefficients ($\alpha = 0.72$ and 0.70), and construct validity evidence is limited because EFA/CFA was not reported. Fourth, the small qualitative sample ($n = 12$) was purposively selected and is appropriate for depth rather than statistical representation. The study also did not receive formal institutional ethics committee approval; although informed consent and confidentiality procedures were followed, this should be considered when evaluating the ethical and institutional context of the study. Fifth, the high quantitative means may partly reflect social desirability. Such a shift would align professional learning more closely with scholarship that conceptualizes equity as an ongoing pedagogical and relational process rather than a fixed set of teaching strategies (van Es et al., 2022). Future studies should triangulate teacher self-reports with classroom observations, student perspectives, and evidence of learning opportunities and should examine equity across diverse school contexts and student populations.

4. CONCLUSION

This study provides context-specific evidence that elementary mathematics teachers in Saudi Arabia generally evaluate their reported instructional practices as strongly aligned with multiple dimensions of mathematical equity. Across the five dimensions, cultural and linguistic equity received the highest mean score, whereas equity in access to educational resources received the lowest, although all dimensions remained within the high range. The qualitative findings illustrated teachers' reported use of diversified instructional and assessment methods, attention to individual differences, promotion of participation, and adaptation of mathematical explanations. At the same time, the joint interpretation revealed an important divergence in the access dimension: teachers reported using diverse resources, but the quantitative rating of resource equity was comparatively lower. The findings therefore contribute evidence about teachers' perceptions and reported practices, not direct evidence of classroom enactment.

These findings reinforce the view that mathematical equity should be understood not merely as equal treatment or uniform access but as a responsive pedagogical commitment to providing differentiated opportunities, resources, support, participation, and assessment according to students' diverse needs and circumstances. The study therefore contributes context-specific empirical evidence to the growing international discourse on equity in mathematics education while highlighting the central role of teachers in translating equity principles into everyday classroom practice. From a practical perspective, the findings point to the importance of sustained professional development that strengthens teachers' reflective capacity, critical awareness of implicit bias, equitable resource provision, and systematic evaluation of their own instructional practices. However, because the study was conducted in one region of Saudi Arabia and relied predominantly on teachers' self-reported practices and perspectives, its findings should be interpreted within these contextual and methodological boundaries. Future research should therefore triangulate teacher self-evaluations with systematic classroom observations, student perspectives, and evidence of actual learning opportunities and outcomes, while extending the investigation across diverse geographical, cultural, and institutional contexts. Such research would enable a more comprehensive understanding of the extent to which teachers' perceived commitments to equity are enacted in authentic classroom interactions and contribute to meaningful, inclusive, and equitable mathematics learning for all students.

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