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Does teachers' self-reported growth mindset ensure growth mindset-oriented feedback practices in the classroom?

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This study examined the congruence/incongruence between teachers' self-reported mindset beliefs and their actual teaching practices within the framework of implicit theories of intelligence. A total of 226 middle school teachers (65.90% female, average age = 31.70 years, $SD = 5.03$; average education year = 16.23, $SD = 1.49$; average teaching experience = 6.52 years, $SD = 4.17$) from Shanghai City, mainland China, completed the growth mindset inventory (GMI) for measuring self-reported growth mindset beliefs and underwent classroom observations, which recorded the frequency of their growth mindset-oriented feedback practices while teaching. Subsequently, the 20 teachers with the most extreme GMI scores (i.e., the 10 teachers with the highest scores and the 10 teachers with the lowest scores from this initial pool) were invited to take part in semi-structured interviews to understand the reasons behind the possible congruence/incongruence. Interesting results were found. First, the results of the spearman correlation and multiple regression analyses suggested incongruence between teachers' self-reported mindset beliefs and their actual feedback practices in real classroom settings for those with growth and neutral mindsets but congruence for those with fixed mindsets. Second, the results of the semi-structured interviews further illustrated that whether teachers demonstrated congruence/incongruence in their growth mindset beliefs and actual growth mindset-oriented feedback practices in the classroom was influenced by contextual factors such as institutional policies, cultural orientations, community expectations, and the general educational competition environment. These findings contribute to a deeper understanding of the factors influencing the alignment between mindset beliefs and teaching practices, which highlight the need for addressing these discrepancies in teacher development programs.

KEYWORDS

implicit theories of intelligence, mindset feedback, teachers' self-reports, classroom practice, educational context

1 Introduction

The concept of a growth mindset suggests that individuals have the potential to increase their intelligence and abilities through persistent effort, resilience, and learning from setbacks (Dweck, 2006). This idea, stemming from the incremental theory of intelligence, contrasts with the concept of a fixed mindset, which stems from the entity theory of intelligence and posits that an individual's intelligence and abilities are static and unchangeable, regardless of effort (Dweck et al., 1995a). Despite their theoretical appeal, the practical effectiveness of growth mindset interventions in educational settings remains debated, with studies revealing mixed

results. For example, in comprehensive meta-analytical studies, [Macnamara and Burgoyne \(2023\)](#) reported that the overall effect of growth mindset interventions on academic achievement was small and nonsignificant after adjusting for potential publication bias ($d = 0.05$). However, [Burnette et al. \(2023\)](#) reported small but significant positive effects on academic achievement ($d = 0.14$). These mixed results highlight the need for further investigation into the conditions under which growth mindset interventions are effective.

The effect of a growth mindset on educational outcomes has been extensively studied in school settings ([Rissanen and Kuusisto, 2023](#)), in which context the role of the teacher is critically important. A teacher's beliefs about intelligence profoundly influence their classroom feedback practices and, consequently, student motivation and mindset development ([Yu et al., 2022](#); [Yeager et al., 2022](#)). Similar research ([Mesler et al., 2021](#)) further underscore this connection, arguing that teachers play a pivotal role in shaping classroom environments that foster growth mindsets. Teachers with a growth mindset are likely to provide feedback that fosters an environment where challenges are welcomed, effort is valued, and mistakes are considered learning opportunities. However, a critical gap in the literature is the predominant reliance on self-reports to assess teachers' growth mindsets, which may not accurately reflect their actual behaviors in classroom settings. This methodological limitation raises concerns about the possible inconsistencies between teachers' self-reported mindset beliefs and their actual instructional practices in real classroom settings. To address this gap, the present study adopted a mixed-methods approach, combining self-report questionnaires, classroom observations and in-depth interviews, to provide a more comprehensive and nuanced understanding of how teachers' self-reported mindset beliefs correlate with and contribute to their observable teaching behaviors in educational contexts. By adopting this approach, the present study aimed to examine the congruence/incongruence between self-reported mindset beliefs and actual mindset behaviors, shedding light on the actual impact of teachers' mindsets on fostering conducive learning environments.

1.1 Self-reported mindset beliefs versus actual teaching practices in real classroom settings

Since the growth mindset concept was introduced and applied within educational settings, self-report methods have predominantly been used to evaluate individuals' mindset beliefs, notably the Likert-scale questionnaires originating from Dweck's work ([Dweck et al., 1995b](#)). This methodology has extensively been used to measure teachers' implicit beliefs regarding intelligence ([Laine et al., 2016](#); [Lin et al., 2022](#); [Yu et al., 2022](#); [Zeng et al., 2019](#)). Although the self-report items based on Dweck's theory of intelligence are a reliable measure of the growth mindset construct, as indicated by recent research with accepted Cronbach's α of 0.76 ([Zhang and He, 2024](#)), these items might have limitations in capturing evidence of teachers' practices in actual classroom settings. For example, [Zhang et al. \(2020\)](#) revealed that teachers who reported having the same mindset exhibited different types of feedback practices while teaching. Similarly, [Rissanen et al. \(2019\)](#) observed that even teachers who self-reported having a strong growth mindset often displayed mixed feedback practices, with a

noticeable presence of fixed mindset-oriented behaviors. This incongruence raises critical questions about the extent to which teachers' self-reported growth mindsets are effectively translated into their teaching practices, introducing uncertainty about the congruence between teachers' mindset beliefs and *in situ* feedback practices.

Indeed, there are relevant studies suggesting the reason for this incongruence may be attributed to contextual heterogeneity ([Yeager and Dweck, 2020](#)). First, such incongruence may be related to social desirability biases, especially among teachers who are cognizant of the growth mindset construct and its desirability within educational discourse ([Song, 2018](#)). Teachers might report alignment with growth mindset principles more as an aspirational identity rather than as a reflection of their actual teaching practices. Second, the manifestation of a growth mindset within teaching behaviors is not necessarily straightforward or complete. The complex dynamics of classroom teaching, which is influenced by a variety of factors, including pedagogical beliefs, institutional policies, and classroom environments, might dilute or modify the expression of a growth mindset in instructional feedback ([Buehl and Beck, 2014](#)). This perspective aligns with Haimovitz and Dweck's Hypothesized Model for the Socialization of Implicit Theories of Intelligence (HMSIT) ([2017](#)), which emphasizes that mindset activation is contextually dependent. Their model suggests that teachers' beliefs about intelligence are not automatically expressed in practice but are shaped by contextual and socialization factors, including institutional demands and immediate classroom challenges. Teaching practices are often the result of interactions among these multifaceted influences, suggesting that a direct translation of growth mindset beliefs into teaching strategies may be overly simplistic and not fully representative of the nuanced reality of classroom dynamics. [Murphy and Reeves \(2019\)](#) further emphasized that organizational mindsets within schools play a crucial role in shaping teaching practices. Performance-driven policies and institutional cultures can either reinforce or suppress the translation of growth mindset beliefs into classroom behaviors, highlighting the systemic nature of this phenomenon. Similarly, [Kroeper et al. \(2022\)](#) highlighted that teachers' and students' perceptions of feedback practices can diverge significantly. Teachers may believe their behaviors align with growth mindset principles, while students perceive them differently, further complicating the relationship between self-reported beliefs and observed practices. Consequently, the absence of a clear correlation between teachers' self-reported growth mindsets and their observable teaching behaviors may pose significant challenges to the effective implementation and validation of growth mindset theory within educational practices, motivating further investigations to clarify such a correlation.

Furthermore, recent studies have reported conflicting results concerning the impact of growth mindsets intervention on students' learning outcomes ([Burnette et al., 2023](#)), which highlights the importance of clarifying whether such conflicting results are caused by the incongruence between teachers' self-reported growth mindsets and their feedback practices in actual classroom settings. For example, studies such as that of [Yeager et al. \(2022\)](#) reported positive correlations between teachers' mindsets and student outcomes, suggesting that teachers' mindsets are predictive of the success of growth mindset interventions. On the other hand, meta-analyses such as that by [Sisk et al. \(2018\)](#) questioned the efficacy of these growth mindset interventions, citing the lack of a significant correlation

between a growth mindset and learning outcomes and suggesting a potential misallocation of resources.

To our knowledge, the limited literature has not adequately addressed these inconsistencies by exploring the potential incongruence between teachers' self-reported mindsets and their actual classroom practices. The incongruence between a self-reported growth mindset and its actual manifestation in the classroom underscores the need for further research to evaluate the real-world application of growth mindset theories in classroom settings. This line of research should aim to provide field-based empirical evidence to address this gap. Such investigations are crucial for advancing the understanding of how growth mindset principles can be most effectively integrated into educational strategies, ensuring that interventions are both theoretically sound and practically viable.

1.2 Incongruence between teachers' mindset beliefs and feedback practices in classrooms

Teachers' feedback often does not reflect their intelligence beliefs, at least not completely. For instance, [Rissanen et al. \(2018, 2019\)](#) reported that even when teachers reported themselves as being incremental theorists, their feedback practices did not consistently support this view, with the teachers sometimes reverting to entity-focused comments, particularly when addressing lower-achieving students. A more recent study ([Zhang et al., 2020](#)) reported that teachers who reported having the same intelligence beliefs had different teaching practices. The incongruence found in the two previous studies is not adequately addressed within the growth mindset framework, as the framework predominantly categorizes behavior on the basis of individual intelligence beliefs without offering an explanation for behaviors that are inconsistent with an individual's intelligence beliefs. However, such evidence underscores the complexity of translating theoretical beliefs into practice and suggests that teachers' feedback practices are influenced by a variety of factors. In fact, previous research has acknowledged that the manifestation of an individual's beliefs is not always straightforward, although [Dweck \(2006\)](#) did not explicitly address this complexity in her initial discussions on the growth mindset concept.

However, a later proposed model HMSIT, as mentioned, implied the complexity of translating theoretical beliefs into practice ([Haimovitz and Dweck, 2017](#)). This model underscores the possibility that teachers' intelligence beliefs may not always be activated in a real classroom setting. It suggests that the development of these theories is influenced by socialization processes, including the impact of parents, peers, and educational contexts. The model highlights that the activation of mindset beliefs is not automatic, but rather depends on contextual cues and experiences. Additionally, the model proposes that these beliefs can evolve over time as individuals encounter new feedback and social influences, leading to changes in how they apply their intelligence beliefs in practice. Specifically, even when teachers hold strong incremental or growth-oriented beliefs about intelligence, these beliefs might not consistently influence their actual interactions with students. One of the reasons for such an inconsistency may be that teachers' responses to specific classroom scenarios are mediated by their immediate objectives, such as motivating a student, managing classroom dynamics, or addressing individual student

needs. For example, a teacher who fundamentally believes in the growth mindset might still provide entity-oriented feedback, e.g., praising intelligence or talent, if they perceive that such feedback would be more motivating in a particular context or for a specific student. This suggests that teachers' practical applications of their intelligence beliefs are not just about translating these beliefs directly into actions but also involve complex decision-making processes where they must weigh the potential impact of their feedback on student motivation.

Another model is helpful when considering such nonalignment. Buehl and Beck's Teacher Ecology Model (2014) offers a comprehensive lens to understand how and why incongruence arises between teachers' mindset beliefs and their actual feedback practices. It posits that a teacher's beliefs are shaped and constrained by various elements within this ecological system, such as school culture, policies, peer relationships, and student needs. The model suggests that incongruence between mindset beliefs and practices can arise when external pressures or environmental constraints limit the teacher's ability to align their beliefs with their classroom behavior. This suggests that while teachers may have a belief in the malleability of intelligence, the actual feedback they provide to students is shaped by a confluence of the internal and external factors identified in the model. These factors include teachers' expertise and knowledge, teachers' prior experiences, cultural influences, the range of student requirements, the educational environment's atmosphere, and systemic demands linked to evaluations and accountability. For example, in a high-stakes testing environment, a teacher's inclination to foster a growth mindset through feedback emphasizing effort and strategy use might be overshadowed by the pressure to achieve immediate academic results, leading to more entity-oriented feedback that praises innate ability. Similarly, teachers working within a school culture that predominantly values performance outcomes may find it challenging to consistently implement growth mindset-oriented feedback, despite their personal beliefs. The interplay of these factors elucidates why the translation of growth mindset beliefs into teaching practices is not straightforward and why teachers' feedback might not always mirror their intelligence beliefs.

1.3 The present study

Given the ongoing debate regarding the practical effectiveness of growth mindset interventions, it is crucial to investigate how well teachers' self-reported growth mindsets are translated into their classroom behaviors. Previous studies ([Burnette et al., 2023](#)) have yielded mixed results, highlighting the need for further investigation into the conditions that influence the success of growth mindset interventions. There is a critical gap in the literature concerning the reliance on self-reports to assess teachers' mindsets, which may not accurately reflect their actual teaching practices. In the present study, we hypothesized that teachers' self-reported growth mindsets would not be translated into corresponding growth mindset-oriented feedback practices while teaching. We sought to identify the contextual factors that influence this translation. By performing a detailed examination of the congruence between teachers' mindset beliefs and classroom practices, this study aimed to enhance our understanding of how growth mindset principles can be most effectively integrated into educational settings. This investigation is essential for advancing

both the theoretical understanding and practical implementation of growth mindset interventions, ensuring that they are both effective and grounded in real classroom dynamics.

On the basis of the HMSIT (Haimovitz and Dweck, 2017) and the teacher ecology model (Buehl and Beck, 2014) and relevant research findings in the literature, we aimed to test our hypothesis with respect to the incongruence between teachers' self-reported mindset beliefs and actual mindset-oriented feedback practices in real classroom settings. We further aimed to explore the factors that may cause this incongruence on the basis of the data collected from semi-structured interviews with teachers. Collectively, the unique contribution of this study lies in its focus on the real-world application of growth mindset theories. By selecting a sample of teachers with extreme scores on the Growth Mindset Inventory (GMI) and conducting detailed classroom observations and interviews, this study aimed to uncover the extent to which self-reported growth mindsets are reflected in actual teaching practices. Moreover, through interviews, the study explored the reasons behind the potential congruence or incongruence between teachers' self-reported growth mindsets and teaching practices in the classroom. This investigation is crucial for bridging the gap between self-perceived mindsets and observable practices, providing empirical, field-based evidence to inform the effective implementation of growth mindset interventions in educational practice.

2 Methods

2.1 Participants

2.1.1 Participants for the questionnaire

A convenience sampling procedure was followed in the present study, with a total of 226 middle school teachers (65.90% female) in Shanghai City, mainland China, included. All participants were ethnic Chinese, with an average age of 31.70 years ($SD = 5.03$), ranging from 23 to 51 years, and an average teaching experience of 6.52 years ($SD = 4.17$). All participants were from public middle schools.

2.1.2 Participants for the classroom observations and interview

For the classroom observations interview phase, a subset of 20 teachers was selected based on their responses to the questionnaire. The 10 teachers who achieved the maximum score of 6 points and the 10 teachers who scored the minimum of 2 points on the mindset belief questionnaire were chosen for *post hoc* interviews. Of these 20 interviewees, 13 were female, with an average age of 32.35 years ($SD = 5.98$), ranging from 25 to 45 years. Four of the interview participants held master's degrees (18 education years), while the rest held bachelor's degrees (16 education years), and an average teaching experience of 7.25 years ($SD = 5.09$).

2.2 Procedures

2.2.1 Questionnaire

Data collection for the present study began with the administration of digital questionnaires, distributed through the Qualtrics and Sojump platforms, alongside traditional paper-based surveys. These surveys aimed to gather data on the

self-reported growth mindset beliefs of all participating teachers. The teachers were asked to complete a questionnaire measuring their personal mindset beliefs, which allowed for the selection of participants for the subsequent phases of the study. The recruitment of teachers for this study was coordinated by the first author, who utilized both electronic correspondence and direct personal engagement to distribute invitations to participate. All participating teachers were informed about the study's aims and assured that their participation was anonymous and voluntary. Consent was obtained at the beginning of the survey, and ethical approval was sought from the authorized ethical review committee prior to the study.

2.2.2 Classroom observations

Following the questionnaire phase, classroom observations were conducted to obtain objective data on teachers' actual feedback practices in the classroom. These observations were designed to provide insights into teachers' behaviors that may not be captured through self-reports. Observations focused on identifying how mindset beliefs were enacted in practice, specifically the types of feedback provided to students. A comprehensive framework was created for the classroom observations based on a review of the literature, which informed the identification of feedback examples consistent with growth and fixed mindsets (refer to Table 1). This summary table provides an informative framework to show tangible, real-life instances of how a growth mindset or a fixed mindset can be manifested in teaching practices within an educational setting, guiding the classroom observations in the present study. This table outlines six types of feedback behaviors according to growth mindset theory (Dweck, 2006), distinguishing between entity-oriented feedback and incremental feedback in teaching practice. Entity-oriented feedback, as highlighted in these studies, is typically aligned with teaching methods that focus primarily on students' performance, such as achieving high scores or excelling in standardized tests. This type of feedback often emphasizes the inherent abilities or talents of students, linking success directly to these fixed traits. In contrast, incremental feedback, which is reflective of a growth mindset approach, is characterized by a pedagogy that places greater emphasis on the development of students' learning abilities. Such feedback tends to highlight the importance of effort, perseverance, and the use of effective strategies, thereby encouraging students to view learning as a continuous, dynamic process. Additionally, the table includes examples of neutral feedback, characterized by language that explicitly indicates neither a fixed nor a growth mindset. Neutral feedback focuses on providing objective, nonjudgmental observations about student performance or behavior.

2.2.3 Semi-structured interviews

Semi-structured interviews were conducted with the selected teachers to gain deeper insights into the congruence or incongruence between their self-reported mindset beliefs and actual teaching practices in the classroom. A two-stage interview methodology was employed to strengthen the reliability of the findings. The first stage consisted of an initial interview conducted prior to classroom observations, allowing teachers to express their views on their teaching practices and mindset beliefs. The second stage was a follow-up interview conducted after the classroom observations, incorporating a stimulated video recall approach.

TABLE 1 Teachers' mindset feedback in teaching practice.

Code/classification	(-) Entity feedback	(N) Neutral feedback	(+) Incremental feedback	Key consideration	Literature
TC/Teacher response to students' challenges	Comfort students by suggesting they avoid challenges and shift focus to simpler tasks (e.g., "If this challenge feels too difficult, it might be beyond your abilities.")	Giving statements or actions is not instructive (e.g., it is okay to experience difficulty.)	Motivating students to embrace challenges as a mean to refine their skills (e.g., "In what ways do you feel your abilities have improved through tackling these challenges?")	Incremental theorists view challenges as opportunities for growth and addressing weaknesses, whereas entity theorists prefer to avoid challenges and focus on tasks within their perceived capability.	Delasandro (2016) , Dweck (1999) , and Kroeper et al. (2022)
TO/Teacher response to students' obstacles	When encountering obstacles, students are advised to abandon efforts due to perceived innate limitations, preventing them from overcoming these challenges (e.g., you should bypass or disregard the obstacle as it beyond your abilities).	Giving statements or actions is not instructive (e.g., it is okay. Encountering obstacles is a common part of the process.)	Prompting students to confront obstacles with motivational or practical advice for surmounting them (e.g., "Do you think increasing your effort or altering your approach to learning might help to this obstacle?")	Incremental theorists are optimistic that barriers can be surmounted with more effort or a reevaluation of learning tactics. In contrast, entity theorists see innate limitations as insurmountable obstacles.	Blackwell et al. (2007) , Dweck (1999) , and Rissanen et al. (2019)
TE/Teacher response to students' effort	Success or failure in tasks is attributed not to effort but to inherent talent, suggesting that no amount of effort can change the outcome if natural ability is lacking. (e.g., Effort will not matter if you are not smart enough.)	Neither affirming the value of effort nor denying the necessity of effort (e.g., that's ok, that is what you did)	Acknowledging the significance of students' diligent work (e.g., "Your perseverance will pay off; dedication is essential for achievement.")	The perspective on effort serves as a critical differentiator between incremental and entity theories. Entity theorists dismiss the importance of effort, holding that abilities are fixed and unchangeable through exertion.	Kroeper et al. (2022) and Rissanen et al. (2018, 2019)
CF/Type of criticism feedback	Criticize students for their supposed lack of innate intelligence (e.g., "You're not smart enough for this, you are slow, you lack intelligence").	Giving statements or actions is not instructive (e.g., this is not your best work, you could do better)	Highlighting the necessity for more effort or a revision of their approach when faced with difficulties (e.g., "You need to amplify your efforts or modify your tactics.")	Incremental theorists ascribe failures to factors outside of innate ability, believing that future setbacks can be prevented with increased effort and improved strategies. On the other hand, entity theorists attribute failure to inherent ability, leading to a mindset of learned helplessness after setbacks.	Kamins and Dweck (1999) and Kroeper et al. (2022)
PF/Type of praise feedback	Compliment students solely on their inherent intellectual abilities (e.g., "You're so smart").	A statement or act of praise without attribution (e.g., you are good, you are better than before, well done)	Commending students for their hard work and adaptability in their strategies (e.g., "Your dedication is commendable, your achievements are a testament to your hard work.")	After achieving success, incremental theorists emphasize the importance of the effort expended, while entity theorists attribute success to natural talent.	Muller and Dweck (1998) and Kamins and Dweck (1999)
TS/Teacher response to success of others	View one student's achievement as diminishing others', implying success is solely a result of having greater natural intelligence (e.g., "He's only successful because he's smarter than you")	Neither learn from others' success case nor see them as threats (e.g., ok, he did well, he was good)	Inspiring students to draw lessons from the success stories of peers (e.g., "Consider the dedication involved, examine his strategies.")	Incremental theorists view others' successes as a source of learning and inspiration, focusing on the efforts and strategies that led to those successes. Conversely, entity theorists perceive others' successes as a reflection of their superior innate qualities, viewing it as a personal threat.	Dweck (1999) and Kroeper et al. (2022)

2.3 Instruments

2.3.1 Growth mindset inventory

The GMI, which was developed by Dweck (1999), was employed to assess mindset beliefs and consists of 4 items. An example statement is “Even your basic intelligence level can be increased considerably.” Participants’ responses to statements on the scale range from 1 (strongly disagree) to 6 (strongly agree). Following Claro et al. (2016), scores from 1 to 2 indicate a belief in ‘entity’ intelligence, suggesting that intelligence is viewed as a fixed trait. Scores between 2.1 and 4.9 fall indicate a ‘mixed theory’ perspective, suggesting a belief that intelligence is partly malleable and partly fixed. Finally, scores from 5 to 6 denote an ‘incremental’ belief in intelligence, reflecting the view that intelligence can be developed and enhanced through effort and learning. Previous research has revealed that the scale has good internal consistency (e.g., $\alpha = 0.78$; Hu et al., 2022). The applicability of the scale for measuring individuals’ mindset beliefs in the Chinese school context has also been supported, with Cronbach’s α values ranging from 0.76–0.80 (e.g., Wang et al., 2021; Zhang and He, 2024). In the present study, the scale was determined to have high internal consistency (i.e., $\alpha = 0.83$). Furthermore, the results of a confirmatory factor analysis revealed an acceptable fit regarding the construct validity of the scale: $\chi^2/df = 3.85$, root mean square error of approximation (RMSEA) = 0.06, adjusted goodness-of-fit-index (AGFI) = 0.91, goodness-of-fit-index (GFI) = 0.94, incremental fit index (IFI) = 0.95, and comparative fit index (CFI) = 0.95.

2.3.2 Classroom observations

Observations were performed to examine the frequency of teachers’ growth mindset-oriented feedback practices across a range of scenarios in educational settings, such as challenges, obstacles, criticism, effort, and success, all of which are key variables identified in Dweck’s Theory of Mindset (2006), as detailed in Appendix Table A1. The frequency count was used as the coding methodology, where each instance of feedback was recorded and categorized on the basis of the scenario it addressed. This approach allowed for a quantitative analysis of the prevalence and distribution of different types of feedback practices. To increase the validity and reliability of the observations, strategies recommended by Creswell (2003) and Wilhelm et al. (2019) were employed, including member checking, peer debriefing, and peer observation. Member checking involved sharing summaries of the findings with the participants to verify the accuracy and credibility of the observations and interpretations. Peer debriefing involved discussions with fellow researchers about the research process and findings, whereas peer observation entailed a fellow researcher conducting classroom observations alongside the primary observer to ensure observational consistency and reduce individual bias. The interrater reliability, measured via the kappa coefficient, was 0.9, indicating a high level of agreement between the observers, which is considered excellent and substantiates the methodological rigor of the observation and coding process (McHugh, 2012).

2.3.3 Interviews

To delve into the potential incongruence between teachers’ self-reported mindsets and their actual feedback practices in the classroom, semistructured interviews were conducted. The interview questions were designed with the guidance of the principles of growth mindset theory (Dweck, 2006) and additional relevant factors (Buehl

and Beck, 2014), mirroring approaches used in research, such as the approach of Zhang and Koshmanova (2021), which aims to capture in-depth and pertinent insights. Sample questions include “How do you perceive intelligence in terms of a growth or fixed mindset?” and “In what ways does the local educational context facilitate or hinder the implementation of your mindset beliefs in teaching?” A two-stage interview methodology was utilized to bolster the study’s reliability. An initial interview and pre-classroom observations were conducted to capture teachers’ preliminary views. A follow-up interview was conducted post-observation, incorporating a stimulated video recall approach. During this session, teachers watched video recordings of their own teaching and were asked to reflect on their feedback practices, discussing whether their actions aligned with a growth or fixed mindset. The video recall served as a powerful stimulus to initiate a reflective dialogue, as it allowed teachers to revisit specific moments in their teaching, providing concrete examples for discussion. This approach encouraged teachers to articulate their thought processes, explain their choices, and consider how their feedback practices were shaped by their beliefs about intelligence. The reflective nature of the discussion prompted by the video recall deepened the analysis of how teachers interpreted and implemented mindset principles in real-time classroom settings, while also shedding light on potential inconsistencies between their self-reported beliefs and observed behaviors. Before analyzing the data, teachers were given the opportunity to confirm or amend their responses, ensuring accuracy and preserving data integrity (Birt et al., 2016). The use of sequential interviews, coupled with video recall, enhanced the depth of reflection and contributed to the reliability and validity of the study (Sherin and van Es, 2005). By combining pre- and post-observation interviews with video recall, this study achieved a nuanced understanding of the relationship between teachers’ self-reported mindsets and their observable feedback practices in the classroom.

2.4 Data analysis

To test the hypothesis with respect to the anticipated incongruence between teachers’ self-reported mindset beliefs and actual feedback practices in classroom settings, Spearman correlation and hierarchical multiple regression analyses were conducted to examine the relationship between the self-report questionnaire scores and the frequency of feedback practices observed in classroom settings. In the correlation analysis, the Spearman correlation coefficient was used to assess the strength of the association between the teachers’ self-reported mindset scores and the observed feedback practice frequencies. In the hierarchical multiple regression analysis, the predictive effect of teachers’ self-reported mindset beliefs on the frequency of observed practices in actual classroom settings (i.e., growth mindset-oriented feedback, neutral mindset-oriented feedback, and fixed mindset-oriented feedback) was analyzed.

Before the multiple regression analyses were conducted, a descriptive analysis was performed to ensure that the variables met the necessary assumptions for regression analysis. The skewness values ranged from -0.30 to 1.15 , and the kurtosis values ranged from -0.50 to 0.85 , indicating that the data were approximately normally distributed. Homoscedasticity was assessed via the Durbin–Watson statistic, with values ranging from 1.75 to 2.20 , all falling within the acceptable range of 1.50 to 2.50 , confirming the independence of the

error terms. Additionally, multicollinearity was evaluated via variance inflation factor (VIF) values. The VIF values for the variables, such as age (VIF = 1.05), gender (VIF = 1.03), teaching experience (VIF = 1.00), educational background (VIF = 1.04), mindset belief (VIF = 1.70), growth mindset-oriented feedback (VIF = 1.08), neutral feedback (VIF = 1.02), and fixed mindset-oriented feedback (VIF = 1.44), were all below the commonly used cutoff of 2.5, indicating no concerns of multicollinearity (Johnston et al., 2018). These analyses substantiated the appropriateness of our dataset for multiple regression analysis, providing a solid foundation for the subsequent regression results. In the hierarchical multiple regression analysis, control variables such as demographic factors (i.e., age, gender, teaching experience, and educational background) were included in Step 1 to establish a baseline for the analysis, controlling for their potential impacts. To test the hypothesis, the predicting variable (i.e., self-reported mindset belief) was entered in Step 2 to evaluate its unique contribution to the different types of feedback (growth mindset-oriented feedback, neutral mindset-oriented feedback, and fixed mindset-oriented feedback) in the classroom. The effect sizes of the predictor variables were calculated via Cohen's f^2 , with f^2 values of ≥ 0.10 , ≥ 0.30 , and ≥ 0.50 indicating small, medium, and large effects, respectively (Cohen, 1988).

Before conducting classroom observations and interviews, a Chi-square analysis was performed to assess differences in sociodemographic characteristics (e.g., age, gender, education years, and teaching experience) between the 20 selected interview participants and the remaining participants in the sample. This analysis confirmed that the two groups were comparable, supporting the validity of the selection process. For the purpose of classroom observation, a structured coding framework was applied on the basis of the coding system shown in Table 1. Specifically, feedback behaviors were categorized into three types: (–) entity-oriented feedback, (N) neutral feedback, and (+) incremental feedback. This table was instrumental in the precise coding of each observed instance of feedback, ensuring that the observational data aligned with the principles of a growth mindset. Furthermore, in the semi-structured interviews, Creswell's data analysis approach for qualitative research was used. This involved analyzing the raw data for interpretation. The first step involved organizing and preparing the raw data, such as data from transcripts, field notes, and other collected materials, for analysis. This was followed by evaluating all the data to gain a general sense of the information and to reflect on its overall meaning. Next, the data

were coded via computer software (NVivo 15). The data involved segmenting and labeling the text to identify significant themes and descriptions. These themes and descriptions were then interrelated to provide a coherent narrative. Finally, the process culminated in interpreting the meaning of these themes and descriptions to draw insightful conclusions. One sample coding is provided (see Appendix Table A2). Following this approach, the author then transcribed all recorded interviews into a Word document. The participants were allowed to check their interview transcripts for accuracy, and they were also given a chance to share any additional information before the interview ultimately concluded. In the interviews, peer debriefing was employed to ensure the transparency and reliability of the data analysis. A colleague experienced in qualitative research independently reviewed the interview transcripts and preliminary analysis results. The peer reviewer provided valuable feedback on the accuracy of the transcripts, the consistency of the data coding, and the overall analysis process. A 95% consistency rate in data coding was achieved in the peer debriefing process. According to Miles and Huberman (1994), a coding consistency rate above 80% is considered high, thereby enhancing the credibility of the findings.

3 Results

3.1 Descriptive statistics and bivariate correlations

Table 2 presents the descriptive statistics and the intercorrelations of the study variables. The results revealed that teachers with self-reported mindset beliefs exhibited a pronounced inclination toward having a growth mindset, with an average score of 4.01 ($SD = 1.98$). With respect to feedback practices in classroom settings, the average growth mindset feedback score was 6.83 ($SD = 1.03$, minimum = 4, maximum = 8), whereas the average fixed mindset feedback score was 9.06 ($SD = 4.23$, minimum = 5, maximum = 12). In relation to the study hypothesis, the results of the correlation coefficients showed that growth mindset beliefs had no significant correlations with growth mindset-oriented feedback practices ($r = 0.05$, $p = 0.38$) or neutral mindset-oriented feedback practices ($r = 0.04$, $p = 0.43$), suggesting a lack of statistical association among the variables, which implies that teachers with a higher self-reported growth mindset score do not necessarily demonstrate more growth and neutral mindset-oriented

TABLE 2 Descriptive statistics and intercorrelations of teachers' self-report mindset beliefs and mindset feedback in the classroom.

Variables	Mean (SD)	1	2	3	4	5	6	7
1. Age	27.70 (5.03)	-						
2. Gender	-	0.03	-					
3. TE	4.52 (1.47)	0.07	-0.03	-				
4. Edu	16.23 (1.49)	0.03	0.05	0.04	-			
5. MB	4.01 (1.98)	0.04	0.04	0.03	0.07			
6. GMF	6.83 (1.03)	0.05	0.03	0.03	0.02	0.05		
7. NMF	7.83 (0.56)	0.03	-0.05	0.02	0.02	0.04	-0.09	
8. FMF	9.06 (4.23)	-0.06	0.04	0.03	-0.04	-0.68***	0.05	0.06

$n_{\text{teachers}} = 226$. ** $p < 0.01$. TE = Teaching Experience, Edu = Education (in years), MB = Mindset Belief, GMF = Growth Mindset Feedback, NMF = Neutral Mindset Feedback, FMF = Fixed Mindset Feedback.

feedback practices in real classroom settings. However, growth mindset beliefs were shown to be significantly negatively correlated with fixed mindset-oriented feedback practices ($r = -0.68, p < 0.001$), suggesting that teachers with a lower self-reported growth mindset score tend to demonstrate more fixed mindset-oriented feedback practices in real classroom settings.

3.2 Multiple regression analyses

The results of multiple regression analyses are summarized in Table 3, which revealed that demographic variables (i.e., age, gender, teaching experience, and educational background) did not significantly contribute to the variance in any of the three types of feedback practices ($R^2 = 0.01-0.03, F(4, 221) = 1.07-1.43, p = 0.31-0.49$). No single demographic variable had a significant effect on teachers' feedback practices ($\beta = -0.09-0.11, p = 0.43-0.67$). The results further illustrated that, after controlling for the effects of demographic variables, teachers' self-reported mindset beliefs had varying levels of predictive power for different types of feedback practices. Specifically, self-reported growth mindsets did not show statistically significant predictive power for growth mindset-oriented feedback practices ($\beta = -0.01, \Delta R^2 = 0.00, \Delta F(5, 220) = 0.87, p = 0.56, f^2 = 0.01$), suggesting that teachers' self-reported growth mindsets do not necessarily contribute to their growth mindset-oriented feedback practices in actual classroom settings. With respect to neutral mindset-oriented feedback practices, self-reported growth mindsets also showed limited predictive power with a negligible effect size ($\beta = 0.02, \Delta R^2 = 0.01, \Delta F(5, 220) = 1.35, p = 0.28, f^2 = 0.02$), indicating

that teachers' self-reported mindset beliefs did not significantly predict neutral mindset-oriented feedback practices in actual classroom settings. For fixed mindset-oriented feedback practices, however, self-reported mindset beliefs showed statistically significant predictive power with a large effect size ($\beta = -0.51, \Delta R^2 = 0.09, \Delta F(5, 220) = 18.15, p = 0.006, f^2 = 0.32$), which suggests that teachers' self-reported fixed mindset beliefs significantly contributed to fixed mindset-oriented feedback practices in actual classroom settings. These results suggest that the study hypothesis with respect to the incongruence between mindset beliefs and actual feedback behaviors in real classroom settings was supported only in the cases of growth and neutral mindset-oriented feedback practices but not in the case of fixed mindset-oriented feedback practices. This hypothesis was partially supported.

3.3 Results of the interviews

Table 4 shows the demographic characteristics of the teachers who participated in the interviews. The Chi-square analysis results indicate that the 20 selected participants (Group 1) were comparable to the remaining participants (Group 2) in terms of age, gender, education years and teaching experience (refer to Table 5). Teachers with self-reported growth mindsets face difficulties in consistently providing growth mindset-oriented feedback in their classrooms. These difficulties are primarily due to the interplay of institutional policies, cultural expectations, and pressures of the educational environment, which mediate or alter the translation of their growth mindset beliefs into classroom practices. In contrast, teachers with

TABLE 3 Results of hierarchical regression analysis regarding the effect of teachers' self-reported mindset on growth, neutral, and fixed mindset feedback.

	Growth mindset feedback			Neutral mindset feedback			Fixed mindset feedback		
	β	SE	f^2	β	SE	f^2	β	SE	f^2
Model 1									
Age	-0.06	0.01	0.01	0.11	0.01	0.01	-0.01	0.01	0.01
Gender	0.10	0.15	0.00	-0.09	0.01	0.00	-0.02	0.03	0.00
TE	0.01	0.05	0.01	-0.04	0.00	0.01	-0.02	0.02	0.01
Edu	-0.02	0.01	0.01	0.04	0.01	0.01	0.01	0.02	0.01
R^2	0.01			0.03			0.02		
$F(4, 221)$	1.07			1.43			1.31		
Model 2									
Step1									
Age	-0.06	0.01	0.01	0.11	0.01	0.01	-0.01	0.01	0.01
Gender	0.10	0.15	0.00	-0.09	0.01	0.00	-0.02	0.03	0.00
TE	0.01	0.05	0.01	-0.04	0.00	0.01	-0.02	0.02	0.01
Edu	-0.02	0.01	0.01	0.04	0.01	0.01	0.01	0.02	0.01
Step 2									
MB	-0.01	0.04	0.01	0.02	0.02	0.01	-0.51**	0.02	0.32
ΔR^2	0.01			0.01			0.09**		
$\Delta F(5, 220)$	0.87			1.35			18.15**		

$n_{\text{teachers}} = 226$. ** $p < 0.01$. TE = Teaching Experience, Edu = Education (in years), MB = Mindset Belief.

TABLE 4 Demographic characteristics of the participant teachers in the interview.

Name (p)	Age	Gender	Edu	TE	School, grade, title and taught course	MB
Alice	29	M	16	8	H, 1&2, Head teacher, Math	6
Brittany	25	F	16	3	G, 2&3, Specialty teacher, Chemistry	6
Catherine	35	F	16	5	K, 1&2, Specialty teacher, Math	6
David	41	F	16	8	O, 2, Head teacher, Chinese	6
Elizabeth	27	M	16	3	C, 1&2&3, Specialty teacher, Music	6
Francesca	33	F	16	5	E, 3, Specialty teacher, Math	6
Gabrielle	25	M	16	1	L, 1, Specialty teacher, Chinese	6
Hannah	29	F	18	5	I, 2, Specialty teacher, Math	6
Isabella	36	M	16	10	P, 1&2, Specialty teacher, English	6
Jacob	27	F	16	2	R, 2, Specialty teacher, Math	6
Katherine	35	M	18	12	E, 1&2, Specialty teacher, History	2
Laura	31	F	16	7	N, 2, Head teacher, Chinese	2
Michael	25	F	16	2	A, 1, Head teacher, Math	2
Nicole	30	F	16	6	Q, 1&2, Specialty teacher, English	2
Owen	34	F	16	7	G, 2, Specialty teacher, Geography	2
Patrick	39	F	16	11	B, 2&3, Head teacher, Chemistry	2
Quinn	39	M	18	15	M, 1&2&3, Specialty teacher, Policy	2
Rachel	25	F	16	2	D, 1, Specialty teacher, Chinese	2
Steven	45	F	16	21	S, 2&3, Specialty teacher, Biology	2
Thomas	37	M	18	12	F, 2&3, Head teacher, English	2

$n_{\text{teachers}} = 20$. TE = Teaching Experience, Edu = Education Years, MB = Mindset Belief.

self-reported fixed mindsets do not face such difficulties. Fixed mindset-oriented feedback tends to be more straightforward and is reinforced by contextual factors. This result confirms the HMSIT and the Teacher Ecology Model, highlighting that the practical implementation of growth mindset-oriented feedback practices is inherently more complex and context dependent. Specifically, the

analysis identified five key themes that illustrate how various aspects of the local context shape teachers' actual implementation of growth mindset-oriented feedback practices in real teaching settings: (1) institutional constraints and support; (2) cultural orientation: long-term goals and short-term goals; (3) community and parental expectations; and (4) the general educational competition

TABLE 5 Chi-square test results for sociodemographic characteristics.

Variable	Group 1 (n = 20)	Group 2 (n = 206)	χ^2	p	V
Age	21–30: 9 (45%)	21–30: 90 (43.8%)	0.01	0.93	0.00
	31–40: 9 (45%)	31–40: 85 (37.6%)			
	41–53: 2 (10%)	41–53: 31 (18.6%)			
Gender	Male: 7 (35%)	Male: 74 (34.1%)	0.02	0.88	0.01
	Female: 13 (65%)	Female: 149 (65.9%)			
Education years	16: 16 (80%)	16: 186 (82.3%)	0.08	0.77	0.02
	18: 4 (20%)	18: 40 (17.7%)			
Teaching experience	≤3 years: 6 (30%)	≤3 years: 80 (35.4%)	0.95	0.81	0.05
	4–6 years: 5 (25%)	4–6 years: 75 (33.2%)			
	7–10 years: 5 (25%)	7–10 years: 41 (18.1%)			
	>10 years: 4 (20%)	>10 years: 30 (13.3%)			

environment. The data collected in this study are organized and presented according to these themes.

3.3.1 Institutional support and constraints

All the participating teachers reported that their feedback practices in the classroom were influenced by the school environment. They all indicated that current school policies are characterized primarily by performance-driven standards. These standards include mechanisms that evaluate teachers on the basis of their students' test scores and an emphasis on immediate academic achievements for promotions and career advancement. Eight teachers from the high-GMI score group reported facing numerous constraints, which were characterized primarily by performance-driven standards. Elizabeth's experience illustrates this struggle.

A: Elizabeth (GMI score: 6), is there any support or constraints in your school regarding the implementation of your mindset beliefs?

Elizabeth: Our administration provides little support for growth mindset-oriented strategies. We rarely have professional development workshops focused on these principles, and there are few resources or opportunities to collaborate with colleagues on this topic. Moreover, the school's performance-driven standards, which evaluate teachers on the basis of their students' test scores and tie promotions to academic achievements, make it even more challenging. This lack of support makes it difficult to integrate growth mindset-oriented practices into my teaching, especially given the pressures to meet immediate academic goals.

Conversely, 7 teachers from the low-GMI score group generally found the performance-focused policies to be more reasonable and reported having moderate support. Thomas's experience illustrates this perspective:

A: Thomas (GMI score: 2), do you view your school's policy as a support or constraint regarding the implementation of your mindset beliefs?

Thomas: The school's focus on test scores aligns with what I believe is necessary for students' success. While there is much pressure to achieve high scores, I find this emphasis on

performance to be fair and reasonable. It helps me focus on immediate academic achievements, which I think are crucial.

This theme suggests that the alignment of school policies with performance-driven standards may explain why teachers with self-reported fixed mindset beliefs are better able to implement their mindset beliefs in the classroom than are those with self-reported growth mindset beliefs. The teachers with fixed mindset beliefs found it easier to navigate and adhere to the performance-focused environment, as it aligned with their emphasis on immediate academic achievements. In contrast, the teachers with growth mindset beliefs struggled to reconcile their long-term developmental goals with immediate performance expectations, resulting in a discrepancy between their self-reported beliefs and actual classroom practices.

3.3.2 Cultural orientation: long-term goals and short-term goals

Cultural orientation also played a role in their approach to growth mindset principles. Twelve teachers, including 6 from the high-GMI score group and 6 from the low GMI score group, identified with differing cultural orientations. Those from the high-GMI score group held long-term goals, emphasizing continuous improvement and future success, but faced difficulties in translating these goals into teaching practices. Conversely, the teachers from the low-GMI score group focused on short-term goals and found it easier to integrate their fixed mindset beliefs into their teaching practices. Isabella and Jacob are good examples of this contrast:

A: Isabella (GMI score: 6), how does your cultural orientation influence your views on growth mindset strategies?

I: As a teacher, I have always valued long-term growth and persistence. My approach is deeply influenced by these principles, which emphasize continuous improvement and future success. However, the school's emphasis on immediate results often suppresses these long-term principles in the classroom. There is significant pressure to demonstrate quick improvements, which makes it challenging to fully implement the growth mindset strategies that I believe in. Despite my best efforts to focus on long-term goals, I often find myself having to balance this with the school's demand for short-term achievements.

A: Jacob (GMI score: 2), how does your cultural background impact your teaching practices?

J: From my experience, I find myself aligning well with the school's focus on short-term goals. I tend to prioritize immediate improvements, such as preparing students for upcoming tests and ensuring that they grasp the material needed for the next exam. My teaching methods are tailored to produce quick, visible results. I frequently use quizzes and drills to help students quickly recall information and perform well on standardized tests. This approach aligns with the school's emphasis on achieving short-term academic success, and I find it effective in meeting those expectations.

The interview findings revealed that the translation of growth mindset principles into teaching practices for the teachers in the high-GMI score group was often suppressed by the school's focus on short-term results. Teachers in this group, such as Isabella, aimed to foster long-term growth and continuous improvement in their students. They believed in the importance of persistence and the gradual development of skills over time. However, they encountered significant challenges due to the school's use of immediate performance metrics and insistence on quick outcomes. This environment made it difficult for them to fully implement growth mindset-oriented strategies that require patience and sustained effort. The pressure to show rapid improvements and meet short-term academic targets often conflicted with their long-term educational goals.

On the other hand, the teachers in the low-GMI score group, such as Jacob, finds that their approach aligned more closely with the school's short-term objectives. They focused on achieving quick, measurable results, such as preparing students for upcoming tests and ensuring that they performed well on standardized assessments. These teachers employed methods that yielded immediate outcomes, such as frequent quizzes and intensive review sessions. This approach was reinforced by the school's emphasis on short-term achievements, allowing the teachers to fulfill the immediate demands placed on them without significant conflict. Their ability to produce rapid improvements and meet short-term goals was seen as a direct response to the educational system's priorities, which often prioritize instant academic success over long-term development. Consequently, their fixed mindset beliefs were translated into their teaching practices within this environment.

3.3.3 Community and parental expectations

This theme indicates that community and parental expectations influence teachers' actual teaching practices in the classroom. All 20 teachers noted that community and parental expectations prioritized academic achievements. However, the impact varied between the two groups. For the high-GMI score group, the teachers struggled significantly; 8 of them felt a sense of pressure and resignation, forcing them to adopt performance-focused teaching methods and abandon their initial desire for holistic development through growth mindset-oriented teaching approaches. Alice's example illustrates this struggle:

A: Alice (GMI score: 6), how do community and parental expectations impact your choice to implement growth mindset principles in the classroom?

Alice: The pressure from parents to achieve high scores is overwhelming. They are concerned primarily with their children's performance on standardized tests, which makes it difficult for me

to focus on long-term growth strategies. Parents frequently request additional tutoring sessions and test preparation, leaving little room for implementing growth mindset principles. The community's focus on immediate academic success often discourages me from pursuing more growth-oriented teaching practices.

In the low-GMI score group, the teachers were more receptive to community and parental expectations that prioritized academic achievements. Nine teachers from this group understood and accepted the focus on performance-oriented abilities, making it easier for them to align their teaching practices with these expectations. Owen's experience illustrates this acceptance:

A: Owen (GMI score: 2), how do community and parental expectations impact your choice to implement growth mindset principles in the classroom?

Owen: The parents in our community place a strong emphasis on academic success and expect quick, measurable results. I find it easier to focus on performance-oriented methods to meet these expectations. This approach aligns with what parents and the community prioritize, making it a more straightforward path to follow.

These findings suggest that community and parental expectations may play a significant role in explaining why teachers with self-reported fixed mindsets are more consistent in using corresponding feedback practices in the classroom than teachers with self-reported growth mindsets are. The alignment of the fixed mindset with performance-focused expectations allowed teachers to implement teaching practices that directly reflected these expectations, leading to more predictable and consistent feedback. In contrast, teachers with growth mindsets faced the challenge of balancing their growth-oriented principles with the strong emphasis on academic achievements, resulting in a discrepancy between their self-reported beliefs and actual classroom practices. This struggle to reconcile conflicting demands may contribute to the less consistent use of corresponding feedback practices while teaching.

3.3.4 General educational competition environment

This theme indicates that the intense competition and high stakes associated with academic performance in their respective educational systems placed additional pressures on teachers in the local context. Fifteen teachers, including 8 from the high-GMI score group and 7 from the low GMI score group, reported that the competitive environment influenced their teaching practices. For the high-GMI score group, the competitive educational environment presented a significant challenge. Despite their commitment to growth mindset principles, these teachers often found themselves constrained by the need to ensure that their students performed well on high-stakes exams. For example, Hannah illustrates these challenges as follows:

A: Hannah (GMI score: 6), how does the competitive educational environment impact your ability to implement growth mindset principles?

Hannah: The competitive nature of our educational system places immense pressure on both students and teachers to achieve

high scores. This environment makes it difficult to focus on long-term growth and development. Although I strive to incorporate growth mindset principles, the need to prepare students for high-stakes exams often takes precedence.

Conversely, teachers in the low-GMI score group found the competitive environment more compatible with their performance-focused teaching approaches. These teachers were already inclined toward emphasizing immediate academic results, making it easier for them to navigate competitive pressures. For instance, Rachel's example exemplifies this alignment:

A: Rachel (GMI score: 2), how do you think the competitive educational environment impacts your teaching?

Rachel: The competitive environment aligns well with my focus on academic performance. I find it easier to adopt teaching methods that ensure that students achieve high scores, as this is what the competition demands. I understand that the growth mindset is important, but the immediate need for academic success often takes priority.

This finding suggests that the general educational competition environment significantly influences teachers' teaching practices, often by dictating the balance between growth mindset principles and performance-focused methods.

3.3.5 Summary of the interview results

The interviews revealed that various contextual factors significantly influenced the teachers' implementation of growth mindset principles in the classroom. Performance-driven school policies, which emphasize test scores and immediate academic achievements for evaluations and promotions, posed significant challenges for the teachers with high GMI scores. These teachers struggled to integrate growth mindset practices due to the lack of institutional support and the pressure to meet immediate academic goals. In contrast, the teachers with low GMI scores found these performance-focused policies to be more supportive of their approaches.

Although the teachers from the high-GMI score group held long-term goals, emphasizing continuous improvement and future success, they faced difficulties in translating these goals into teaching practices. Conversely, the teachers from the low-GMI score group focused on short-term goals and found it easier to integrate their fixed mindset beliefs into their teaching practices. This is because the school environment predominantly emphasized immediate academic results. Similarly, community and parental expectations strongly emphasized academic achievements. The high-GMI score group faced significant pressure, leading some teachers in this group to abandon their holistic development approaches, whereas those in the low-GMI score group aligned their methods with these expectations. The competitive academic environment exacerbated these challenges, with the teachers in the high-GMI score group struggling to balance their long-term growth principles with the demands for high-stakes exam performance, whereas those in the low-GMI score group found it easier to navigate these pressures. These findings suggest that teachers with self-reported fixed mindsets are better able to translate their mindset beliefs into teaching practices because the performance-focused environment aligns more closely with their emphasis on immediate academic achievements. In contrast, teachers with growth mindsets face the

challenge of reconciling their long-term developmental goals with immediate performance expectations, resulting in incongruence between their self-reported beliefs and actual classroom practices.

4 Discussion

4.1 Theoretical implications: findings on the incongruence between teachers' self-reported mindset beliefs and their actual teaching practices

The quantitative findings indicated that teachers' mindsets were only partially translated into their teaching practices, and further qualitative findings identified some of the reasons for such incongruence; in particular, the findings revealed why teachers with self-reported fixed mindsets better implemented their mindset beliefs into their teaching practices than those with self-reported growth mindsets did. In relation to the literature, the present study provides empirical evidence suggesting that, notably, teachers reporting both growth mindsets and fixed mindsets were found to exhibit a blended feedback style in the classroom. This result challenges the assumption that self-reported growth mindset beliefs are always aligned with growth-oriented feedback practices. Instead, it reinforces earlier research findings that highlighted the incongruence between teachers' reported mindset beliefs and their observable teaching practices (Rissanen, 2019; Zhang et al., 2020).

The mechanisms through which teachers' mindset beliefs are moderated by contextual factors in actual classroom settings remain uncertain, as growth mindset theory primarily focuses on individual beliefs without fully considering contextual influences. The present study critiques this oversight, as the teachers with self-reported growth mindsets exhibited fixed mindset-oriented feedback practices, and vice versa. These contradictions might be explained by [Buehl and Beck's \(2014\) Teacher Ecology Model](#), [Haimovitz and Dweck's HMSIT \(2017\)](#), which account for the interplay of institutional, cultural, and systemic factors in shaping teaching practices. While previous studies have indicated that growth mindset beliefs are associated with positive classroom behaviors ([Yeager et al., 2022](#)), the lack of significant correlations between growth mindset beliefs and growth mindset-oriented feedback practices in this study challenges such assumptions. This divergence underscores the importance of recognizing the influence of contextual factors. Specifically, systemic pressures, such as performance-driven school policies and community expectations, may override individual beliefs, thereby explaining why fixed mindset-oriented feedback was more consistently aligned with teachers' self-reported fixed mindsets. These results partially support the hypothesis of congruence but also suggest that external factors may inherently favor certain feedback practices, irrespective of personal beliefs.

Furthermore, the findings revealed that the behavioral patterns of individuals with growth or fixed mindsets are not strictly antagonistic, as posited by [Dweck \(2006\)](#). The observed blending of feedback styles suggests that the growth mindset and fixed mindset are not opposite ends of a unidimensional spectrum but rather separate factors. Teachers' feedback practices often represent a compromise between their mindset beliefs and contextual demands. For instance, while teachers with self-reported growth mindsets aspire to foster resilience

and learning, they may adopt fixed mindset-oriented feedback practices under pressure to meet immediate academic goals. This behavioral flexibility highlights the limitations of binary mindset classifications and calls for a more nuanced understanding of how teachers navigate the complexities of classroom dynamics. This result challenges the broader literature on growth mindset interventions. While meta-analyses such as [Burnette et al. \(2023\)](#) report modestly positive effects, the present study suggests that these effects may not translate into consistent classroom practices without systemic alignment. Similarly, the lack of alignment between self-reported beliefs and teaching behaviors raises questions about the validity of self-report measures in evaluating the effectiveness of mindset interventions. Future research should prioritize field-based investigations that account for the interplay between individual beliefs and systemic constraints to develop more effective growth mindset interventions.

Collectively, these findings suggest that the capacity to adapt one's mindset to align with the demands of specific educational contexts is perhaps more critical than rigidly adhering to a single mindset orientation, whether growth or fixed. Teachers who demonstrated flexibility in their feedback practices, blending elements of growth and fixed mindsets, were better able to meet the diverse needs of their students. This highlights the value of mindset adaptability as a dynamic process that evolves in response to contextual factors, such as institutional policies, cultural expectations, and classroom dynamics. Such adaptability challenges the binary framework of growth versus fixed mindsets and underscores the necessity of examining how contextual pressures shape teachers' mindset-related behaviors. Future research should explore how fostering such adaptability in teachers can enhance their effectiveness in implementing mindset-oriented feedback practices, particularly in complex and varied classroom settings.

4.2 Practical implications: insights for further research on growth mindset interventions

This study contributes to further research on growth mindset interventions by showing that behaviors typically associated with a growth mindset can also be observed in teachers with a fixed mindset. This discrepancy raises an essential question for research in the growth mindset domain, which depends only on self-reported data: do actual teaching practices reflecting a teacher's mindset influence outcomes more than their self-reported beliefs do? Additionally, it prompts another question: Can we rely solely on teachers' self-reported mindsets to predict student learning outcomes without verifying that these mindsets are effectively reflected in their teaching behaviors? The available literature lacks an understanding of the mechanisms by which teachers' mindsets are translated into teaching practices, although recent research ([Kroeper et al., 2022](#)) has revealed that teachers and students do not always share the same perceptions of certain teaching behaviors, whether they are indicative of a growth mindset or a fixed mindset. Consequently, this study suggests that to better implement growth mindset theory in teaching practices, the focus should be on exploring the actual interpretations of feedback practices in real teaching contexts through classroom observation. In particular, increasing attention has been given to the role of teachers

in implementing growth mindset-oriented practices in the classroom ([Mesler et al., 2021](#); [Rissanen and Kuusisto, 2023](#)). The translation of teachers' beliefs about intelligence into their teaching practices, rather than their self-reported mindsets, dictates the nature of their mindset-oriented feedback practices.

Furthermore, this study underscores the necessity for context-driven approaches in the formulation of growth mindset interventions, aligning with previous research ([Rissanen et al., 2018](#); [Yeager and Dweck, 2020](#)) that highlights the critical role of context in the application of growth mindset interventions. The observed discrepancy between teachers' self-reported mindsets and their actual teaching practices underscores the multifaceted influences on teaching methodologies, extending beyond simple mindset categorizations. Moreover, the results of the interviews indicated that individual cultural orientation and school climate are two major factors that can either support or impede the implementation of teachers' mindset-oriented practices in the classroom. Equally important is the role of the formal curriculum in shaping teachers' mindsets and feedback practices. The curriculum's objectives, particularly its emphasis on either skill development or standardized performance, can significantly influence how teachers internalize and apply mindset principles in their classrooms. When the curriculum prioritizes fostering students' critical thinking and problem-solving skills, it aligns more closely with growth mindset-oriented practices, encouraging teachers to adapt their feedback to emphasize effort and learning. Conversely, curricula that heavily emphasize test performance and achievement may inadvertently reinforce fixed mindset feedback practices, as teachers focus on measurable outcomes rather than developmental processes. Understanding the interplay between curricular objectives and teachers' mindsets is crucial for designing interventions that are not only theoretically sound but also practically relevant in real classroom settings. To address these challenges, it is essential to develop in-service training programs and interventions that help teachers effectively integrate growth mindset principles into their teaching practices. Professional development initiatives should focus on equipping teachers with strategies to translate their mindset beliefs into actionable classroom behaviors, considering the specific demands of their educational contexts. For example, training programs could include reflective practices and collaborative discussions that enable teachers to critically assess their feedback methods and align them with growth mindset approaches. Additionally, interventions should provide teachers with tools to navigate potential cognitive dissonance arising from systemic demands that may conflict with growth mindset principles. By offering support and resources, educational institutions can facilitate teachers' ability to maintain the authenticity of their teaching practices while meeting institutional expectations.

This complexity implies that effectively fostering a growth mindset requires strategies that are attuned to the various factors impacting teacher behavior. While existing research may not extensively explore the complexity of implementing growth mindset-oriented practices, recent studies ([Rissanen et al., 2021](#); [Zhang et al., 2020](#)) consistently highlight the context-dependent nature of the growth mindset concept. Thus, it becomes imperative to design growth mindset interventions that are informed not only by theoretical underpinnings but also by the practical realities of diverse contextual and educational settings. Theories such as Bronfenbrenner's ecological systems theory ([Paquette and Ryan, 2001](#)), the Teacher Ecology Model ([Buehl and](#)

Beck, 2014), and the HMSIT (Haimovitz and Dweck, 2017) might be helpful in identifying the educational factors that elicit or hinder the implementation of growth mindset interventions. Taking a more practical perspective, a key factor to acknowledge is the importance of balancing the endorsement of different mindsets according to the demands of the educational system. While a growth mindset is often associated with fostering resilience, adaptability, and lifelong learning (Yeager and Dweck, 2012), its effectiveness may depend on the alignment with the system's objectives. For example, in educational systems that prioritize skill development, a growth mindset-oriented approach emphasizing effort and learning processes may be more beneficial. Conversely, in systems heavily driven by standardized testing and measurable performance outcomes, endorsing a fixed mindset in specific scenarios might enable teachers to provide clear, result-oriented feedback that aligns with institutional expectations. However, this flexibility seems to carry inherent risks, such as creating inconsistencies in teaching practices or leading to confusion among students when feedback strategies appear contradictory. For instance, students in mixed feedback environments may struggle to reconcile messages that value both performance outcomes and continuous improvement. Additionally, teachers operating in systems with rigid performance metrics may find it challenging to incorporate growth mindset principles without facing institutional pushback, resulting in potential cognitive dissonance. This tension could undermine the authenticity of their practices, as they balance systemic demands with their personal beliefs.

To mitigate these issues, interventions focusing on teachers' mindsets should offer strategies for effectively blending growth and fixed mindset feedback in a way that aligns with both educational objectives and teachers' personal beliefs. Training programs can emphasize adaptive teaching practices that allow teachers to remain flexible and responsive to various educational demands without sacrificing the benefits of growth mindset principles. Furthermore, as many educational systems shift from exam-oriented frameworks to competency-based approaches, teachers need tools to recalibrate their feedback practices accordingly. In-service training that provides ongoing support and resources can help teachers adapt to these changes, ensuring their practices remain effective and aligned with current educational priorities. Finally, the importance of contextual understanding cannot be overstated. The expectations placed on teachers in different cultural and policy contexts vary widely, influencing how mindsets are interpreted and implemented. For instance, education systems emphasizing collectivist values may require a different balance between growth and fixed mindsets compared to systems prioritizing individual achievement. A nuanced understanding of these dynamics is essential for designing interventions that effectively balance these competing demands while ensuring that both teacher and student outcomes are optimized.

4.3 Limitations and directions for future research

The primary concern regarding the study's methodology is its sample size, which may not adequately represent the diverse array of teaching populations. This is particularly problematic if the majority of the participants were from specific regions or possessed similar educational backgrounds, as it could restrict the generalizability of the

findings. Such a limited sample might not fully reflect the broad spectrum of teachers' experiences and perspectives, potentially skewing the results and their applicability to different contexts or countries. To enhance the external validity, future research should aim to include a broader and more diverse sample, encompassing a wider range of geographical areas and educational contexts, possibly across various countries or educational systems. The inclusion of teachers from different cultural and socioeconomic backgrounds would provide a more comprehensive understanding of how growth mindset theories are perceived and applied in diverse settings.

In addition to the sample size, the study's reliance on cross-sectional data is a critical limitation. This methodological approach hampers the ability to establish causal links or track how self-reported growth mindsets and their classroom applications evolve over time. Cross-sectional studies capture a single moment in time, which may not reflect the dynamic nature of teaching practices and mindset belief implementation. For a more comprehensive understanding, subsequent studies should consider employing longitudinal research methods. The use of these methods would enable researchers to observe changes and potential causal relationships between teachers' self-reported mindsets and their actual teaching practices in the classroom over time, offering deeper insights into the dynamics at play in the implementation of growth mindset-oriented practices. Longitudinal studies would also allow for the examination of how external factors, such as changes in educational policy or professional development initiatives, impact the persistence and evolution of growth mindset-oriented practices.

Regarding the instruments used in this study, we focused on teachers' implicit theories of their own intelligence, which we believe are directly relevant to their teaching practices. However, we acknowledge that a broader assessment of their views on intelligence in general could offer additional insights into how these beliefs influence teaching behaviors. Future research could benefit from a more comprehensive approach by including both self-report measures and observational indicators. This would allow for the identification of congruent and incongruent groups, enhancing the depth of subsequent interviews and providing a richer understanding of how mindset beliefs manifest in teaching practices.

The overarching recommendation is that future research on growth mindset theory should focus closely on the activation mechanisms of mindset beliefs. A good question would be how growth mindset concepts are interpreted and integrated into various educational contexts. It is recommended that future studies employ a variety of methods to evaluate additional influential factors, aiming to uncover the activation mechanisms behind intelligence beliefs. Mixed-method approaches combining quantitative surveys with qualitative interviews or classroom observations could provide a richer, more nuanced understanding of the processes through which growth mindset beliefs influence teaching practices. Additionally, experimental designs could be utilized to test specific interventions aimed at fostering growth mindsets and to assess their effectiveness in different educational settings. Moreover, exploring the role of professional development and ongoing support in sustaining growth mindset practices would be valuable. Future research should investigate how continuous training and reflective practices influence the long-term adoption of growth mindset principles among educators. Understanding the barriers to and facilitators of growth mindset implementation can guide the design of more effective

professional development programs, ensuring that teachers are equipped with the tools and knowledge necessary to foster a growth mindset culture in their classrooms.

5 Conclusion

In conclusion, this study underscores that teachers' self-reported growth mindset beliefs do not guarantee growth mindset-oriented feedback practices in the classroom, challenging the reliance on self-reports as the sole measure of teachers' mindset beliefs. This highlights the necessity of considering the broader educational context and the various factors that influence the translation of a growth mindset into teaching behaviors. Future research is encouraged to explore the mechanisms that underlie the implementation of growth mindset principles in educational environments, thereby offering more localized frameworks for developing effective growth mindset interventions in schools.

Data availability statement

The datasets presented in this article are not readily available because due to privacy and confidentiality concerns, the generated datasets are not available by request. We strictly adhere to data protection and ethical guidelines and do not share any data that could potentially identify participants. Requests to access the datasets should be directed to Kai Zhang, kaizhan126@gmail.com.

Ethics statement

The studies involving humans were approved by Human Research Ethics Committee, The Education University of Hong Kong. The studies were conducted in accordance with the local legislation and

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institutional requirements. The participants provided their written informed consent to participate in this study. Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

Author contributions

KZ: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Writing – original draft. W-jH: Conceptualization, Supervision, Writing – review & editing.

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Conflict of interest

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Appendix

TABLE A1 Classroom observations form.

Name (pseudonym)	Challenges			Obstacles			Efforts			Criticism			Praise			Success of others		
	-	N	+	-	N	+	-	N	+	-	N	+	-	N	+	-	N	+

TABLE A2 Sample coding.

Theme	Category	Code	Example
Institutional support and constraints	Lack of support	Little professional development workshops	“Our administration provides little support for growth mindset strategies. We rarely have professional development workshops focused on these principles...”—Elizabeth (GMI score: 6)
	Performance-driven standards	Evaluations based on students’ test scores	“The school’s performance-driven standards, which evaluate teachers based on their students’ test scores...”—James (GMI score: 2)
Cultural orientation	Short-term goals	Focus on immediate results	“I find myself prioritizing immediate goals and seeking rapid improvements, such as preparing students for upcoming tests...”—Jacob (GMI score: 2)
	Long-term goals	Emphasis on continuous improvement	“Our cultural background teaches us to value long-term growth and persistence. The school supports this by encouraging us to focus on continuous improvement...”—Isabella (GMI score: 6)
Community and parental expectations	Pressure for academic success	Focus on test scores	“The pressure from parents to achieve high scores is overwhelming. They are primarily concerned with their children’s performance in standardized tests...”—Alice (GMI score: 6)
	Balancing expectations	Maintaining growth mindset approach	“Parents in our community often expect immediate academic results, which conflicts with the principles of growth mindset. This dual expectation forces me to constantly navigate between satisfying parents’ demands and adhering to growth mindset principles.”—Emily (GMI score: 2)
General educational competition environment	Competitive pressures	Emphasis on high scores	“The competitive nature of our educational system puts immense pressure on both students and teachers to achieve high scores...”—Hannah (GMI score: 6)
	Navigating pressures	Balancing growth and performance	“While I strive to incorporate growth mindset principles, the need to prepare students for high-stakes exams often takes precedence, making it challenging to focus on long-term growth.”—Rachel (GMI score: 2)