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RECEIVED 30 April 2025

ACCEPTED 03 June 2025

PUBLISHED 02 July 2025

CITATION

Behera RR, Ramasami K, Acharya AK,
Sharma S, Subhrajyoti T and Tikader B (2025)
Traversing multicultural and multilingual
educational landscapes in Odisha, India: the
impact of adaptive performance, cultural
intelligence, and transformational leadership
on foreign language teacher wellbeing.
Front. Educ. 10:1621041.
doi: 10.3389/feduc.2025.1621041

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Traversing multicultural and multilingual educational landscapes in Odisha, India: the impact of adaptive performance, cultural intelligence, and transformational leadership on foreign language teacher wellbeing

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Teacher wellbeing (TWB) among foreign language teachers (FLT) remains an overlooked area in educational research, despite their critical role in fostering linguistic and cultural competence. FLT face unique challenges, particularly in multilingual and multicultural regions, which can significantly impact their wellbeing. This study examines the interrelationships among FLT's adaptive performance (AP), cultural intelligence (CQ), and principals' transformational leadership (TL) in shaping TWB. Focusing on six border districts of Odisha, India, where FLT operate within a multicultural and multilingual educational landscape, this study employs a quantitative research design to propose and test seven hypotheses. Data collected through a structured questionnaire from FLT across these districts were analyzed using Partial Least Squares Structural Equation Modeling. Results reveal that AP, CQ, and TL significantly influence TWB. Moreover, CQ acts as a complementary partial mediator between AP and TWB and between TL and TWB, indicating that AP enhances TWB not only by equipping teachers with the flexibility to manage professional challenges but also by fostering intercultural competence, which further improves their work experiences. Additionally, TL plays an important role in creating a supportive and culturally responsive work environment that strengthens TWB. These insights emphasize the need for school leadership to cultivate an inclusive and adaptive educational atmosphere. While the study is region-specific and relies on self-reported data, it contributes to the understanding of TWB in multilingual and multicultural settings. The findings provide valuable guidance for policymakers and educational leaders in designing strategies to enhance both FLT's and students' wellbeing in diverse educational contexts.

KEYWORDS

adaptive performance, cultural intelligence, foreign language teachers, multicultural classrooms, multilingual classrooms, Odisha India, transformational leadership, wellbeing

1 Introduction

1.1 Foreign language teachers (FLT)s: significance and challenges in contemporary education

Foreign language teachers (FLT)s are pivotal in enhancing linguistic proficiency and promoting intercultural understanding (Hossain, 2024). Beyond language instruction, they immerse students in cultural contexts, fostering intercultural competence and global awareness (Richards et al., 2013; Borg, 2006). By integrating cultural perspectives into their teaching, FLT)s advance inclusivity, empathy and help shape globally conscious learners (Petrenko et al., 2020; Fernández-Corbacho et al., 2024). Despite their critical role, FLT)s encounter multifaceted challenges like, emotional, cognitive, physical, cultural, linguistic, methodological, and systemic (MacIntyre et al., 2019; Babic et al., 2022; Budzińska, 2023; Mercer, 2023). Emotional labor is especially taxing, as teachers have to navigate personal and culturally sensitive interactions while managing both their own and students' emotions (King and Ng, 2018; Golombek and Doran, 2014). This, coupled with the need to sustain linguistic proficiency and address learners' language anxiety (Horwitz, 1996), increases burnout risk. This profession also demands energy-intensive, interactive pedagogies that are cognitively and physically draining (Borg, 2006). Rigid curricula, varying student proficiency levels, and limited resources add further strain (Wieczorek, 2016). Moreover, the dynamic nature of language requires ongoing content updates, likening teaching to aiming at a "moving target" (Talbot and Mercer, 2018).

Systemic stressors also affect FLT)s in private institutions, where insecure employment, characterized by zero-hour contracts, income instability, and limited benefits, undermines wellbeing (Mercer, 2023; Wieczorek, 2016). Many teachers face insufficient institutional support, limited professional development, and few advancement opportunities, fostering exploitation and isolation (Mason, 2017). Language teaching's lower prestige compared to other disciplines further diminishes morale (Mason, 2017). Intercultural pressures intensify these challenges, as teachers adapt to unfamiliar environments, often at the cost of personal identity and stability (Cowie, 2011). As noted by Piechurska-Kuciel (2011), FLT)s frequently endure greater demands than peers in other subjects, resulting in higher burnout rates.

The rapid rise of AI and language-learning apps like Duolingo, Babbel, and Rosetta Stone has also reshaped the role of FLT)s. These platforms provide personalized, gamified learning that challenges traditional instruction and raises concerns about the diminishing role of teachers (Yuen and Schlote, 2024; Wei, 2023; Ghamrawi et al., 2024). Consequently, FLT)s must redefine their value—from knowledge transmitters to facilitators helping students navigate technological tools (Kwon et al., 2021). The COVID-19 pandemic further accelerated digital integration, compelling teachers to adopt unfamiliar technologies amid emotional and cognitive strain (Tao and Gao, 2022; Hu and Shen, 2024). Hybrid models remain prevalent post-pandemic, intensifying the demand for ongoing professional adaptation (Wang et al., 2024).

In culturally and linguistically diverse country like India, FLT)s face unique challenges. With over 19,500 regional languages

and dialects, linguistic diversity profoundly influences classroom communication, pedagogy, and student engagement (Kaushik and Khanna, 2023). Urban classrooms often feature students with multiple first languages, necessitating teachers to navigate complex linguistic terrains for effective instruction (Lightfoot et al., 2022). In rural and tribal areas, stark language gaps between native dialects and the instructional medium hinder learning (Pattanaik, 2020). Cultural diversity further shapes pedagogy, demanding sensitivity to varying traditions, belief systems, and socio-cultural norms (Pandey and Jha, 2023). Students' cultural backgrounds often influence learning preferences, prompting the need for context-specific teaching strategies (Bose and Gao, 2022). These intricacies, amplified by socio-economic and resource disparities, pose substantial barriers to effective instruction and necessitate stronger institutional support (Bhattacharya, 2013).

These evolving challenges significantly affect FLT)s' wellbeing and performance. Given the strong interconnections among teacher wellbeing (TWB), teacher effectiveness, and student outcomes, as well as the reciprocal link between student and TWB (Dreer, 2022; Bilz et al., 2022; Roffey, 2012), urgent action is required from both educational leadership and teachers themselves. When supported by responsive administration, teachers are more likely to thrive emotionally and professionally, fostering positive learning environments and improved student engagement and academic success (Braun et al., 2020; Ertürk, 2022; Dreer, 2023; Lee and Swaner, 2023). In increasingly complex educational settings, adaptability emerges as a vital skill for navigating linguistic and cultural diversity and responding to evolving pedagogical demands. Through adaptability, teachers can develop cultural intelligence (CQ), which can foster inclusive and responsive classrooms while enhancing their wellbeing and professional satisfaction. Additionally, transformational leadership (TL) from administrators/employers can inspire and support teachers, fostering CQ development, ultimately strengthening TWB. Despite extensive research on TWB, existing studies have largely overlooked FLT)s, especially in culturally and linguistically diverse settings like India. Moreover, limited attention has been given to the combined roles of AP, CQ, and TL in shaping FLT)s' wellbeing. This study attempts to addresses these gaps by exploring how these variables interact in the under-researched context of Odisha's border districts. By integrating multiple theoretical frameworks and testing a comprehensive structural model, this research offers novel empirical insights into the mechanisms that foster FLT)s' wellbeing in multilingual and multicultural environments. To explore these critical interconnections, the following section reviews existing literature on adaptability, TL, CQ, and TWB, highlighting their empirical and theoretical foundations.

1.2 Literature review

TWB: TWB is a crucial component of the educational system, influencing both teacher effectiveness and student outcomes (Mercer and Gregersen, 2020; Jin et al., 2021; Mercer, 2023). High TWB is associated with greater motivation, creativity, and classroom management, which foster student engagement and academic success (Klusmann et al., 2008; Roffey, 2012; Kunter

et al., 2013). It also strengthens teacher-student relationships, further enhancing student wellbeing and performance (Sammons et al., 2007; Spilt et al., 2011; Braun et al., 2020; Dreer, 2023). Conversely, low TWB contributes to job dissatisfaction, emotional exhaustion, and diminished instructional quality (Harding et al., 2019; Cann et al., 2021). Despite its importance, TWB is a complex, multidimensional construct lacking a universally accepted definition (Fox et al., 2023; Dreer, 2023; Chen et al., 2024). Hascher and Waber (2021) identified six key research perspectives on TWB:

- Wellbeing psychology—as the interplay of emotional and cognitive factors.
- Positive psychology—focused on flourishing and personal growth.
- Work and organizational psychology—using models like Job Demands-Resources.
- Education-focused research—addressing teaching stressors and job satisfaction.
- Health research—linking TWB to mental health frameworks like WHO's.
- Interdisciplinary approaches—drawing from sociology and psychology.

These varied conceptualizations lead to inconsistencies in how TWB is defined, measured, and addressed, complicating cross-study comparisons and practical implementation. A widely adopted framework by Collie et al. (2015) includes dimensions such as workload, teacher-student relationships, and organizational wellbeing. This framework has since guided and shaped research on TWB antecedents and intervention strategies.

Adaptability and TWB: adaptability is a multifaceted concept with varied interpretations across disciplines (Stokes et al., 2010). In workplace settings, it is typically defined as the capacity to respond effectively to change, regulate psycho-behavioral responses under uncertainty, and manage diverse job demands (Martin et al., 2012; Collie et al., 2018). This capability, often termed adaptive performance (AP), refers to one's ability to adjust behavior to meet evolving work demands (Krijgheld et al., 2024). Pulakos et al. (2000) proposed a widely adopted framework for AP, comprising eight dimensions: interpersonal and cultural adaptability, navigating uncertainty, managing crises, creative problem-solving, learning new tasks and technologies, stress management, and adaptation to physically challenging environments. This taxonomy remains influential across professional contexts (Loughlin and Priyadarshini, 2021).

In educational contexts, teacher adaptability is closely linked to wellbeing (Vincent et al., 2023), with adaptable teachers reporting reduced burnout, lower stress, and higher job satisfaction (Sheridan et al., 2022; Garcia et al., 2024). Collie and Martin (2017a,b) found that greater adaptability enhances psychological wellbeing and improves teachers' capacity to meet professional demands. Adaptability also functions as a self-regulatory mechanism (Vincent et al., 2023) that strengthens resilience in challenging environments (Mansfield et al., 2014). Beyond personal wellbeing, adaptability boosts teacher motivation, engagement, and organizational commitment (Martin et al., 2021; Collie

et al., 2018; Davis et al., 2024). It also indirectly supports student achievement by fostering supportive learning environments through improved wellbeing (Collie and Martin, 2017a; Garcia et al., 2024). Overall, adaptability acts as a vital personal resource, enhancing social-emotional wellbeing, job satisfaction, and instructional effectiveness (Collie and Martin, 2016, 2017b; Collie R. et al., 2020).

TL and TWB: TL is a leadership style that inspires and motivates followers to exceed expectations through a shared vision, staff development, support, empowerment, innovation, and charismatic role modeling (Carless et al., 2000). In educational contexts, TL significantly influences teachers' professional outcomes and wellbeing. Key TL attributes, such as inspirational motivation and idealized influence, enhance autonomous motivation, while individualized consideration supports engagement in complementary tasks (Hyseni Duraku and Hoxha, 2021). Principals practicing TL help align teachers with institutional goals, promoting self-actualization and mitigating burnout (Tsang et al., 2022; Kiliç et al., 2024). Providing individualized professional support also boosts teachers' self-efficacy and competence (Geijssels et al., 2003). TL has been shown to foster creativity, resilience, and job satisfaction (Kaya, 2024), while also cultivating a supportive school climate that strengthens TWB (Baroman and Quirap, 2024). In international schools, TL behaviors have been linked to reduced stress and improved wellbeing (Merritt and Procter, 2022). A systematic review by Meidolina et al. (2023) affirms these links, though further research is needed to clarify how distinct TL dimensions impact TWB.

CQ and TWB: CQ refers to the capacity to adapt effectively in intercultural interactions (Sternberg et al., 2022). It is commonly understood as a multidimensional construct encompassing cognitive, metacognitive, motivational, and behavioral components—or alternatively, cultural metacognition, cross-cultural skills, and cultural knowledge (Earley and Ang, 2003; Neto et al., 2021). Research highlights CQ contributing to wellbeing of teachers by enhancing job satisfaction and promoting culturally responsive teaching. For instance, Rana et al. (2024) reported a positive correlation between CQ and psychological wellbeing, while Sims (2011) linked CQ to teachers' job satisfaction and retention in international schools. Efeoglu and Ulum (2017) similarly found strong associations between CQ and professional wellbeing. Teachers with high CQ foster inclusive classrooms, bridging cultural gaps and improving student outcomes (Dahdah, 2017; Karataş et al., 2023). Additionally, culturally intelligent educators enhance students' own CQ, preparing them for global citizenship (Goh, 2012; Rajaram, 2023). In contrast, culturally unaware teachers may neglect students' cultural identities, resulting in unmet academic and emotional needs (Molina, 2013).

AP and CQ: research consistently demonstrates a strong positive relationship between CQ and AP, identifying CQ as a key enabler of effective adjustment in culturally diverse environments (Sahin and Gürbüz, 2014; Suharti et al., 2019). Individuals with high CQ exhibit enhanced behavioral flexibility, which supports higher AP in cross-cultural contexts (Schlaegel et al., 2021; Teixeira and Zanela Klein, 2024). Azevedo (2018) further suggests that such individuals readily modify their behaviors to meet situational demands, reinforcing their adaptability.

Studies involving international students and military leaders also affirm CQ's role in fostering adaptability across educational and professional domains (Al Shdaifat et al., 2016; Chu and Zhu, 2023). Overall, CQ emerges as a critical competence for navigating new environments, diverse work cultures, and evolving job demands (Nzitunga and Nyanway, 2019).

TL and CQ: CQ is widely recognized as a key determinant of TL, especially in multicultural educational and organizational contexts. Numerous studies report a positive relationship between CQ and leadership effectiveness in school settings (Aldhaheeri, 2017; Velarde et al., 2022). Keung and Rockinson-Szapkiw (2013) found that school leaders with high CQ display stronger TL behaviors, enhancing their ability to lead in culturally diverse environments. Likewise, Zarak and Ahmadian (2012) identified a positive correlation between CQ and TL among principals, suggesting that culturally intelligent leaders better align their vision with diverse educational needs. Attar et al. (2019) further supported this connection, while Alon and Higgins (2005) highlighted CQ's importance in global leadership success. Collectively, these findings present CQ as an essential competency for transformational leaders, enabling them to navigate cultural complexities, promote inclusivity, and facilitate adaptive learning environments.

1.3 Research gaps

While corporate research has established positive links among employee wellbeing, AP, CQ, and TL, these relationships are underexplored in educational settings, especially for FLT, whose wellbeing remains largely neglected (MacIntyre et al., 2019; Talbot and Mercer, 2021; Budzińska, 2023; Mercer, 2023). Moreover, although adaptability is considered essential for effective teaching (Collie and Martin, 2016), its specific role in managing everyday challenges and enhancing TWB is poorly understood, particularly for FLT (Sheridan et al., 2022; Roseth and Blackwell, 2022). Existing research tends to focus on STEM and even music teachers (Collie and Martin, 2017a; Holliman et al., 2022; Roseth and Blackwell, 2022; Collie R. J. et al., 2020), further marginalizing FLT in this discourse.

Similarly, research on leadership and TWB has highlighted the positive influence of supportive leadership qualities on TWB (Kaltiainen and Hakanen, 2022; Meidelina et al., 2023; See et al., 2024). However, despite the growing global interest in this field, studies examining the intersection of leadership and TWB remain geographically limited (Meidelina et al., 2023), necessitating further investigation in culturally and educationally diverse settings. CQ, though increasingly recognized for its influence on teacher and student wellbeing (Gokalp, 2022), remains underexamined in educational literature. Importantly, while CQ is known to predict AP and TL, little research has explored whether AP and TL reciprocally influence CQ—posing a significant gap in understanding potential bidirectional relationships.

Furthermore, studies on AP, CQ, TL, and TWB have primarily focused on psychological and workplace dimensions (Meidelina et al., 2023; Davis et al., 2024; Vincent et al., 2023), with limited attention to TWB as a holistic construct. Finally, another critical concern is the scarcity of research on TWB in India. A comprehensive review spanning 49 years (1973–2021) revealed that

only 18 studies have been conducted on TWB in the Indian context, accentuating the urgent need for further exploration (Yu et al., 2022).

1.4 The context of the study

The identified research gaps are particularly pronounced in Odisha, a linguistically and culturally diverse Indian state where teachers engage with multiple Odia dialects alongside Hindi, and English. Odisha's borders with Andhra Pradesh, Jharkhand, Chhattisgarh, and West Bengal further amplify this complexity. Border regions are highly multilingual, with communities speaking combinations of Odia, Hindi, Bengali, Santali, Telugu, and tribal languages. These linguistic layers are accompanied by distinct cultural traditions, which shape communication styles, student engagement, and classroom dynamics. Such diversity places heightened demands on FLT, highlighting the importance of examining their TWB in relation to adaptability, leadership support, and CQ to ensure effective teaching in this context.

1.5 The present study, theoretical underpinnings, conceptual model and hypotheses

Building on the identified research gaps, this study investigates the interrelationships among FLT's AP, CQ, and school principals' TL in shaping FLT's TWB across six border districts of Odisha: Balasore, Baripada, Sundargarh, Bargarh, Gajapati, and Ganjam. These districts—bordering West Bengal, Jharkhand, Chhattisgarh, and Andhra Pradesh—are marked by pronounced linguistic and cultural diversity. Teachers in these regions operate in multilingual settings and navigate overlapping cultural influences, adding complexity to their professional roles. This research aims to deepen understanding of the factors influencing TWB and generate actionable insights for school leaders, employers, and policymakers committed to supporting FLT in such dynamic environments. This study adopts an integrative theoretical lens to examine how FLT's TWB in multicultural and multilingual educational settings. The conceptual framework draws on five established theories to illuminate these interconnections. Self-Regulation Theory (Bandura, 1991; Zimmerman, 2000) explains AP as a dynamic, self-directed process wherein teachers monitor and adapt their instructional strategies in response to diverse classroom demands. In doing so, they cultivate metacognitive awareness and behavioral flexibility—key dimensions of CQ (Earley and Ang, 2003)—which facilitate effective engagement in culturally diverse environments. Transformational Leadership (TL) Theory (Bass and Avolio, 1994) and Leader-Member Exchange (LMX) Theory (Graen and Uhl-Bien, 1995) clarify how leadership influences CQ. Transformational leaders motivate teachers through idealized influence, intellectual stimulation, and individualized consideration, fostering professional growth in culturally diverse contexts. LMX theory complements this by emphasizing high-quality leader-teacher relationships, which promote CQ through access to resources such as mentorship and cross-cultural collaboration. The link between CQ and TWB is further informed

by Conservation of Resources (COR) Theory (Hobfoll, 1989) and the Job Demands–Resources (JD-R) Model (Demerouti et al., 2001). COR theory frames CQ as a psychological resource that reduces stress by enabling effective responses to cultural demands. The JD-R model positions cultural complexity as a job demand and CQ as a personal resource that buffers against burnout, enhances job satisfaction, and supports emotional resilience (Bakker and Demerouti, 2017). Collectively, these theories provide a robust foundation for examining how FLT's AP and perceived TL influence TWB, with CQ serving as a mediating resource in multilingual and multicultural educational contexts. In this study, we posit CQ not only as a personal resource but also as a bridge that explains how adaptability and school leadership influence FLT's wellbeing in multicultural and multilingual educational environments. Drawing on established theoretical frameworks this study proposes the following conceptual model (Figure 1), and seven hypotheses.

a) Direct Effects Hypotheses

- H1: AP has a positive impact on TWB
- H2: TL has a positive impact on TWB
- H3: AP has a positive impact on CQ
- H4: TL has a positive impact on CQ
- H5: CQ has a positive impact on TWB

b) Mediation Hypotheses

- H6: CQ mediates the relationship between AP and TWB
- H7: CQ mediates the relationship between TL and TWB

constructs. AP was assessed using an eight-item scale adapted from the Job Adaptability Inventory (Pulakos et al., 2002) and Pulakos et al.'s (2000) taxonomy. Due to proprietary restrictions (Charbonnier-Voirin and Roussel, 2012), a modified version was developed to reflect seven of the original eight dimensions: managing work stress, crisis response, creative problem-solving, interpersonal adaptability, learning new tasks and technologies, navigating uncertainty, and physical adaptability. Cultural adaptability was excluded due to conceptual overlap with CQ, consistent with Marques-Quinteiro et al. (2015) and Pulakos et al.'s (2000) argument that all dimensions need not be included in every context. CQ was measured using the 10-item Short Form Cultural Intelligence (SFCQ) Scale (Thomas et al., 2015), covering metacognition, skills, and cultural knowledge. The SFCQ has demonstrated cross-cultural reliability in diverse contexts (Neto et al., 2021). TL was assessed using the 7-item Global Transformational Leadership Scale (Carless et al., 2000), which evaluates key TL behaviors such as vision, staff development, empowerment, support, innovation, leading by example and charisma. This scale has been validated across multiple cultural settings. TWB was measured using the 16-item Teacher Wellbeing Scale (TWBS) (Collie et al., 2015), capturing three subdomains: workload wellbeing (TWB_W), organizational wellbeing (TWB_O), and student interaction wellbeing (TWB_S). AP, CQ, and TL items were rated on a 7-point Likert scale (1 = Strongly Disagree to 7 = Strongly Agree), while TWB used a 7-point scale ranging from 1 = Negatively to 7 = Positively. Higher scores across all constructs indicated more favorable outcomes.

2 Method

2.1 Sample selection, respondents' profile, and data collection

This study targeted English language teachers from private and government schools across six border districts of Odisha: Balasore, Baripada, Sundargarh, Bargarh, Gajapati, and Ganjam. A convenience sampling strategy was adopted to ensure proportional representation across school types. The final sample reflected a balanced demographic profile across age, gender, and teaching experience (see Table 1). Teachers were recruited through direct engagement with school administrations and were informed about the study's objectives, voluntary participation, and right to withdraw at any time. A total of 928 teachers consented, and questionnaires were distributed via designated school coordinators. After preliminary screening for completeness and consistency, 816 valid responses were retained for analysis. Data collection spanned over 5 months (October 2024–February 2025). The final sample size exceeded the recommended threshold of 300 for factor analysis, ensuring statistical reliability and validity (Hair et al., 2021).

2.2 Measures

The questionnaire consisted of two sections: (i) demographic information (age, gender, teaching experience, school type, and district), and (ii) standardized scales measuring four key

2.3 Data analysis

Data analysis followed a sequential approach: (i) data examination and preliminary analyses, (ii) exploratory factor analysis (EFA) to refine the measurement scales, and (iii) PLS-SEM to evaluate the measurement and structural model, and test hypotheses. All analyses were conducted using IBM SPSS 27 for preliminary/EFA and SmartPLS4 for PLS-SEM.

3 Results

3.1 Data examination and preliminary analyses

Following data screening, 816 complete responses were retained for EFA. No missing values were detected. Normality was assessed through skewness and kurtosis, both falling within acceptable thresholds of 3 and 10 respectively (Kline, 2005). The dataset's suitability for factor analysis was confirmed by a Kaiser-Meyer-Olkin (KMO) value of 0.963, exceeding the recommended minimum of 0.70, and indicating excellent sampling adequacy. Bartlett's test of sphericity was also significant ($\chi^2 = 18,706.85$, $df = 820$, $p < 0.001$), supporting the factorability of the correlation matrix.

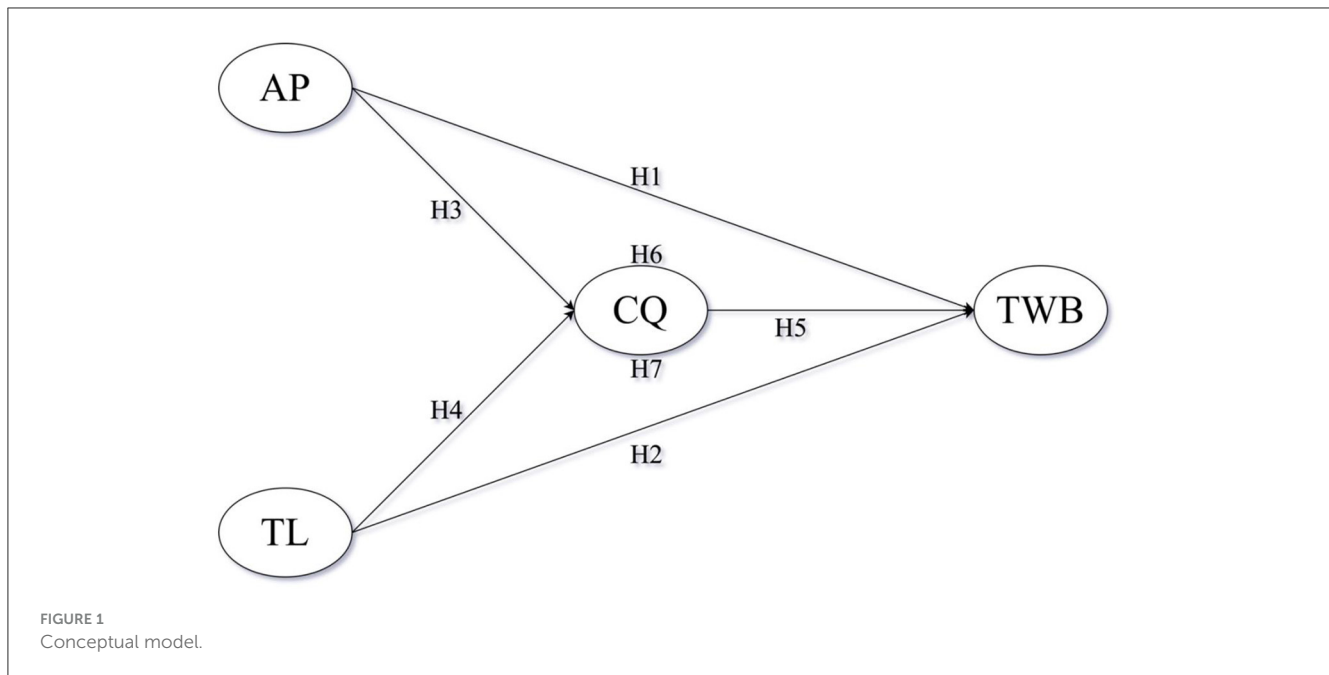


TABLE 1 Demographic profile of the respondents.

Demographic variable	Category	Frequency	Percentage
Gender	Male	439	53.80
	Female	377	46.20
Age (in years)	21–30	204	25.00
	31–40	281	34.44
	41–50	212	25.98
	51–60	119	14.58
Teaching experience (in years)	0–5 years	169	20.71
	6–10 years	253	31.00
	11–20 years	211	25.86
	21 years and above	183	22.43
School type	Government	451	55.27
	Private	365	44.73
District	Balasore	152	18.63
	Baripada	138	16.91
	Sundargarh	141	17.28
	Bargarh	124	15.20
	Gajapati	129	15.81
	Ganjam	132	16.18

3.2 Exploratory factor analysis

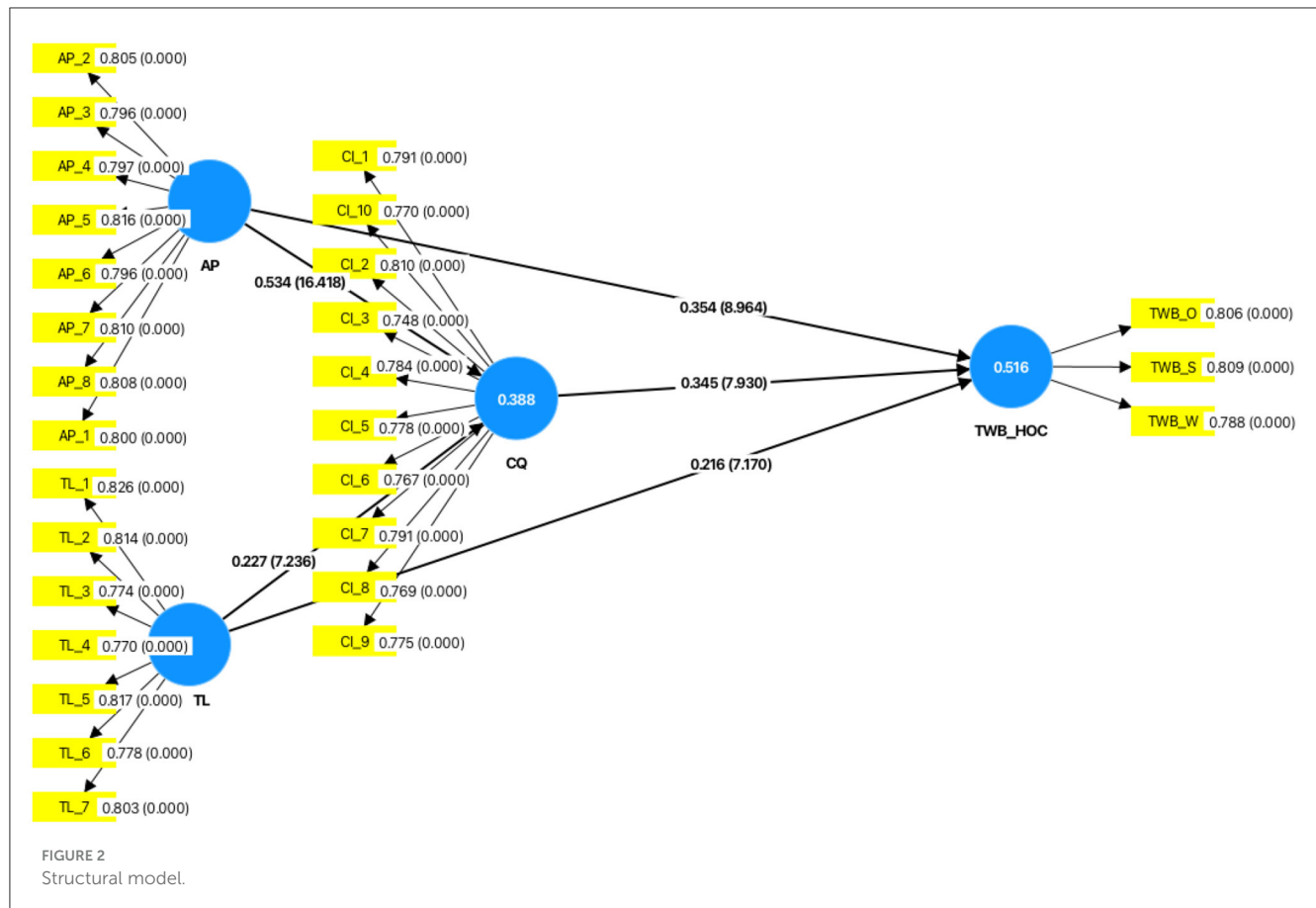
EFA was conducted using Principal Component Analysis with Varimax rotation. A six-factor structure emerged, with item loadings aligning well with theoretical constructs (Supplementary Table 1). Extracted factors accounted for 62.47%

of the total variance—exceeding the acceptable threshold of 60%—and all retained factors had eigenvalues above 1. Items with low loadings (<0.65) or significant cross-loadings were excluded to ensure construct clarity. Reliability testing showed strong internal consistency, with Cronbach's alpha values exceeding 0.70 for all factors. Harman's One-Factor Test indicated the first factor accounted for 32.2% of the variance, well below the 50% threshold, suggesting that common method bias (CMB) was not a significant concern.

3.3 Measurement model assessment

To capture the multidimensional nature of TWB construct, the measurement model assessment was conducted in two stages: first for lower-order constructs (Supplementary Figure 1), and then for the higher-order construct (Figure 2) using the disjoint two-stage approach. This approach was essential to accurately model TWB as a second-order latent variable composed of three distinct but interrelated dimensions (TWB_W, TWB_O, and TWB_S), ensuring both conceptual clarity and statistical rigor. The measurement models were evaluated using SmartPLS, focusing on reliability, convergent validity, and discriminant validity. For all constructs—lower and higher order—the factor loadings, Cronbach's alpha (α), Composite Reliability (CR), and Average Variance Extracted (AVE) exceeded recommended thresholds (α and CR > 0.70 ; AVE > 0.50) (Supplementary Tables 2, 5), confirming internal consistency and convergent validity (Gora et al., 2019).

Discriminant validity (Supplementary Tables 3, 6) was supported by both the Fornell-Larcker criterion and Heterotrait-Monotrait (HTMT) ratio. In all cases, square roots of AVE were greater than inter-construct correlations, and all HTMT values were below the 0.90 threshold (Fornell and Larcker, 1981; Chetoui



and Lebdaoui, 2022). Cross-loadings (Supplementary Tables 4, 7) confirmed that each item loaded highest on its intended construct (Hair et al., 2017; Su et al., 2022). All VIF values were below 3, indicating no multicollinearity concerns (Kock and Lynn, 2012). These results validate the reliability and discriminant structure of both the lower and higher-order measurement models, enabling robust structural model analysis.

3.4 Structural model analysis

Following measurement model validation, the structural model (Figure 2) was assessed using key quality indicators: coefficient of determination (R^2), effect size (f^2), predictive relevance (Q^2), and model fit indices. The model demonstrated substantial explanatory power, with CQ showing an R^2 of 0.388—indicating that AP and TL explain 38.8% of its variance—and TWB higher order construct (TWB_HOC) with an R^2 of 0.516, meaning AP, CQ, and TL jointly explain 51.6% of its variance. Adjusted R^2 values (0.386 for CQ; 0.514 for TWB_HOC) confirmed model stability by accounting for complexity. Effect size (f^2) analysis revealed that AP had a strong effect on CQ ($f^2 = 0.446$) and a moderate effect on TWB_HOC ($f^2 = 0.171$), while CQ moderately influenced TWB_HOC ($f^2 = 0.151$). TL's contributions were smaller, with $f^2 = 0.081$ for CQ and $f^2 = 0.086$ for TWB_HOC. Predictive relevance (Q^2) values—0.382 for CQ and 0.438 for TWB_HOC—exceeded zero, indicating good predictive capacity. Model fit indices further supported the model's

robustness, with SRMR = 0.037 and NFI = 0.931, reflecting an acceptable fit.

3.5 Hypothesis testing: direct effects

A bootstrapping procedure with 5,000 resamples was employed to assess the significance of both direct and indirect (mediated) effects. The results of direct effects (Table 2) suggest that AP had a significant positive effect on CQ ($\beta = 0.534$, $t = 16.418$, $p < 0.001$), with a strong effect size ($f^2 = 0.446$). Additionally, AP significantly influenced TWB_HOC ($\beta = 0.354$, $t = 8.964$, $p < 0.001$) with a moderate effect size ($f^2 = 0.171$). CQ also showed a significant positive impact on TWB_HOC ($\beta = 0.345$, $t = 7.930$, $p < 0.001$), contributing moderately to its variance ($f^2 = 0.151$). Moreover, TL exhibited a significant effect on CQ ($\beta = 0.227$, $t = 7.236$, $p < 0.001$) with a small effect size ($f^2 = 0.081$), and it also significantly influenced TWB_HOC ($\beta = 0.216$, $t = 7.170$, $p < 0.001$) with a small effect ($f^2 = 0.086$). These findings confirm that all proposed relationships were supported, demonstrating the predictive relevance of the model.

3.6 Hypothesis testing: indirect effects

The mediation analysis (Table 3) revealed that CQ partially mediates the relationships between AP, TL, and TWB_HOC. For

TABLE 2 Hypotheses testing for direct effects.

Hypotheses	Relationship	β	SE	t value	95%CI		p	Decision	f ²	Effect
H1	AP→ TWB_HOC	0.354	0.039	8.964	0.275	0.429	0.000	Supported	0.171	Moderate
H2	TL→ TWB_HOC	0.216	0.030	7.170	0.157	0.275	0.000	Supported	0.086	Small
H3	AP→ CQ	0.534	0.033	16.418	0.469	0.596	0.000	Supported	0.446	Strong
H4	TL→ CQ	0.227	0.031	7.236	0.166	0.289	0.000	Supported	0.081	Small
H5	CQ→ TWB_HOC	0.345	0.044	7.930	0.261	0.433	0.000	Supported	0.151	Moderate

H6 (AP→ CQ→ TWB_HOC), the indirect effect was significant ($\beta = 0.185$, $t = 6.777$, $p < 0.001$), with a total effect of $\beta = 0.539$ and a VAF of 34.32%, indicating complementary partial mediation. Similarly, for H7 (TL→ CQ→ TWB_HOC), the indirect effect was significant ($\beta = 0.079$, $t = 4.969$, $p < 0.001$), with a total effect of $\beta = 0.295$ and a VAF of 26.78%, also supporting complementary partial mediation.

4 Discussions

This study examined the interrelationships among FLT’s AP, CQ, and TWB and school principals’ TL within a linguistically, culturally, and professionally complex context of Odisha, India. As a state with vast linguistic and cultural diversity, FLT’s in Odisha navigate classrooms composed of students from varied backgrounds, requiring them to constantly adapt their pedagogical approaches (Behera et al., 2024). This complexity is further intensified by systemic professional challenges, including resource constraints, curriculum rigidity, and institutional pressures, all of which adversely impact TWB. Given these intersecting demands, FLT’s must manage multiple variables to ensure effective instruction while maintaining their own wellbeing. Findings of this study reinforce the significance of these challenges, with the structural model analysis confirming the hypothesized direct and indirect relationships among the study variables.

Regarding H1, the results suggested that FLT’s AP significantly impacted their TWB ($\beta = 0.354$, $p < 0.001$), highlighting AP’s critical role in promoting wellbeing among teachers in dynamic and challenging environments. This aligns with prior research, which emphasizes the significance of adaptability in helping teachers manage uncertainties and professional stressors (Roseth and Blackwell, 2022). Beyond enhancing TWB, adaptability contributes to related factors such as emotional regulation, self-efficacy, and resilience, all of which are crucial for sustaining TWB (Li, 2023; Lu et al., 2024). Additionally, research accentuates the importance of cultivating adaptability among pre-service teachers in teacher education programs, preparing them to navigate the complexities of the profession once they transition into full-time teaching roles (Granziera et al., 2019). Ensuring that teachers develop adaptive skills early in their careers can strengthen their ability to cope with the ever-changing nature of educational environments, ultimately promoting both their effectiveness and long-term wellbeing. Similarly, the results confirmed H3, indicating that FLT’s AP significantly impacted their CQ ($\beta = 0.534$, $p < 0.001$). This suggests that teachers who demonstrate higher adaptability are

more likely to develop CQ, enabling them to navigate diverse linguistic and cultural classroom environments more effectively. Adaptability allows teachers to modify their instructional strategies, communication styles, and classroom interactions to align with students’ linguistic and cultural backgrounds, fostering inclusivity and engagement (King et al., 2022; Aljuaid, 2024). These findings reinforce the view that teachers’ AP is not only crucial for managing professional challenges but also instrumental in enhancing their ability to work in multicultural and dynamic educational settings (Collie and Martin, 2016; Collie R. et al., 2020), by enhancing their CQ.

The results also confirmed H2, suggesting principals’ TL positively impacted FLT’s TWB ($\beta = 0.216$, $p < 0.001$). This reinforces existing research highlighting the role of supportive and visionary leadership in fostering a positive work environment for teachers (Akbar et al., 2024). Transformational leaders, by providing individualized support, motivation, and a shared sense of purpose, enhance teachers’ job satisfaction and psychological wellbeing (Metaferia et al., 2023; Zhou and Guo, 2024; Paganin et al., 2025). In challenging educational contexts, where systemic and instructional pressures are prevalent, TL serves as a critical factor in mitigating burnout and enhancing teachers’ sense of competence, self-determination, and work meaningfulness (Tsang et al., 2022). With regards to H4, findings affirmed that school principals’ TL positively influenced FLT’s CQ ($\beta = 0.227$, $p < 0.001$). This suggests that when principals exhibit TL behaviors, teachers are more likely to develop CQ needed to navigate diverse classroom environments effectively. While existing literature primarily highlights a strong correlation and direct effects of CQ on TL in both educational and corporate settings (Velarde et al., 2022; Keung and Rockinson-Szapkiw, 2013; Nam and Park, 2019), this study provides novel empirical evidence—similar to Afsar et al. (2019)—demonstrating that TL at the school leadership level can actively contribute to teachers’ CQ development. Through individualized consideration and personal attention, transformational leaders inspire followers/teachers to learn about diverse cultures, beliefs, and value systems, Afsar et al. (2019) thereby promoting inclusive teaching practices and fostering an environment that enhances their ability to adapt to multicultural and multilingual classrooms. These findings emphasize the broader role of school leadership in shaping not only instructional quality but also teachers’ CQ.

Concerning H5, the findings confirmed that FLT’s CQ significantly influenced their TWB ($\beta = 0.345$, $p < 0.001$) emphasizing the importance of FLT’s CQ in enhancing FLT’s ability to navigate diverse classroom settings and maintain

TABLE 3 Hypotheses testing for indirect effects.

Hypotheses	Relationship	Indirect effect β	SE	t value	95%CI	p	Direct effect β	Total effect β	VAF %	Mediation type
H6	AP→CQ→TWB_HOC	0.185	0.027	6.777	0.134 0.239	0.000	0.354	0.539	34.32	Complementary partial
H7	TL→CQ→TWB_HOC	0.079	0.016	4.969	0.050 0.111	0.000	0.216	0.295	26.78	Complementary partial

their wellbeing. In increasingly diverse educational environments, teachers with higher CQ are better equipped to manage cross-cultural interactions, adapt instructional strategies, and create inclusive classrooms. Although research on this topic is limited, the findings align with previous studies suggesting that teachers with strong CQ experience lower burnout levels (Nevisi and Alasadi, 2021) and greater job satisfaction (Gokalp, 2022). Additionally, research from the corporate sector supports the relationship between CQ and employee wellbeing, as individuals working in multicultural and multilingual environments with high CQ tend to experience greater job satisfaction and overall wellbeing (Lam et al., 2022; Yang, 2023).

The mediation analysis also provided empirical support for H6 and H7, confirming that CQ serves as a complementary partial mediator in the relationships between FLT’s AP→ FLT’s TWB and school principals’ TL→ FLT’s TWB. Specifically, the indirect effect of AP on TWB through CQ was significant ($\beta = 0.185, p < 0.001$), indicating that a substantial portion of AP’s influence on TWB operates through CQ. However, the persistence of a significant direct effect suggests that AP contributes to TWB both directly and indirectly via CQ. This highlights the dual role of AP in fostering TWB—not only by equipping teachers with the flexibility to manage professional challenges but also by enhancing their intercultural competence, which further promotes positive work experiences in diverse educational settings. Similarly, the indirect effect of TL on TWB through CQ was also significant ($\beta = 0.079, p < 0.001$), demonstrating that TL enhances TWB partly by fostering CQ among teachers. Transformational leaders, by inspiring and supporting their teams, encourage teachers to develop cultural awareness and adaptability, which in turn contribute to their wellbeing. The complementary partial mediation effect confirms that TL not only has a direct impact on TWB but also indirectly influences it by strengthening teachers’ CQ. This finding stresses the important role of school leadership in shaping a supportive and culturally responsive work environment, ultimately enhancing TWB in diverse and complex educational contexts.

The analysis of effect sizes offers deeper insight into the relative influence of the study variables within Odisha’s multicultural and multilingual educational context. Based on Cohen’s (1988) thresholds—0.02 (small), 0.15 (moderate), and 0.35 (strong)—AP demonstrated a strong effect on CQ ($f^2 = 0.446$), reflecting the critical importance of adaptability for FLT’s operating in linguistically and culturally complex classrooms. The moderate effect of AP on TWB ($f^2=0.171$) suggests that while adaptability contributes substantially to wellbeing, it functions alongside other factors, particularly intercultural competencies. CQ also showed a moderate effect on TWB ($f^2 = 0.151$), reinforcing its role as a psychological and pedagogical resource for navigating Odisha’s layered linguistic and cultural dynamics. In contrast, TL exhibited small effect sizes on both CQ ($f^2 = 0.081$) and TWB ($f^2 = 0.086$). This could be attributed to contextual realities such as rigid school governance, bureaucratic authority, limited principal-teacher engagement in daily classroom matters, or varying leadership visibility across districts (Khora, 2017). Nevertheless, even small but significant effects of TL highlight its enabling role in fostering inclusive, culturally responsive teaching environments.

This study offers significant theoretical contributions by integrating AP, TL, CQ, and TWB into a comprehensive

framework, thereby advancing existing research on TWB in multicultural and multilingual educational settings. While prior studies have explored the exogenous constructs in relation to various forms of psychological and workplace wellbeing, the current study empirically establishes their interconnections with the specific construct of TWB. In particular, it highlights the mediating role of CQ in the AP→ TWB and TL→ TWB relationships, offering a more nuanced understanding of how adaptability and TL contribute to FLT's overall wellbeing through the development of CQ. By demonstrating that CQ serves as a complementary partial mediator, this study extends the understanding of how adaptability and leadership influence TWB beyond direct effects, reinforcing the importance of intercultural competencies in educational psychology and leadership research. Furthermore, this research contributes to the growing body of work on CQ in education by demonstrating that TL at the school leadership level significantly enhances teachers' CQ. While previous studies primarily focus on the impact of CQ on TL (Keung and Rockinson-Szapkiw, 2013; Velarde et al., 2022), this study provides novel evidence that leadership itself plays a role in fostering CQ among teachers. This shifts the discourse from viewing CQ as merely an individual trait to recognizing it as a skill that can be cultivated through supportive leadership, thereby enriching theories of educational leadership and teacher development. Similarly, this study advances the understanding of the relationship between AP and CQ by demonstrating that AP significantly contributes to CQ development among FLT's. While CQ is widely established as a predictor of AP (Sahin and Gürbüz, 2014; Suharti et al., 2019), little was known about whether AP, in turn, influences CQ. This gap in empirical research presented an opportunity to explore potential reciprocal or reverse causal relationships, addressing whether adaptability can actively shape CQ over time. By confirming that AP plays a crucial role in enhancing CQ, this study challenges the traditional assumption that CQ is a static competency and instead positions it as a dynamic attribute that evolves through teachers' ability to adapt to changing linguistic, cultural, and professional demands. This insight contributes to the broader discourse on teacher adaptability, highlighting its role not only in professional resilience but also in fostering CQ necessary for effective teaching in diverse classrooms. By bridging educational psychology, leadership theory, and intercultural competence, this study offers a holistic framework for understanding TWB in diverse educational settings.

This study offers actionable insights for educational institutions, school leaders, policymakers, and teacher education programs on enhancing TWB through the development of AP, CQ, and TL. Given AP and CQ's pivotal roles in helping FLT's manage multicultural and multilingual classrooms while maintaining psychological and occupational health, adaptability training should be central to professional development. Strengthening these competencies not only supports teacher wellbeing but also enriches student learning outcomes. The findings further underscore TL's influence in fostering a supportive work environment that enhances both AP and CQ. Leadership strategies that empower teachers are essential for promoting inclusive, resilient classrooms. As such, leadership development should emphasize both TL competencies and CQ to better equip principals and administrators to support

their teachers in diverse educational/school contexts. These insights also provide insights into the selection, training, and professional development of both teachers and school leaders. AP and CQ should be considered as key criteria in teacher recruitment and training, ensuring that teachers are well-prepared to handle the complexities of multicultural and multilingual education. Ultimately, targeted interventions that cultivate TL and adaptability can strengthen teacher resilience and wellbeing, supporting a sustainable and effective teaching workforce.

5 Limitations and future directions

While this study offers both theoretical and practical contributions, it is not without limitations. First, its focus on the socio-cultural context of Odisha may limit the generalizability of findings to regions with different institutional, economic, or cultural conditions. Second, the use of convenience sampling may introduce selection bias, particularly underrepresenting rural, tribal, or marginalized school contexts. Third, the cross-sectional design restricts causal inferences, as the relationships among AP, CQ, TL, and TWB may evolve over time. Reliance on self-reported data may also introduce social desirability bias. Finally, the study centers primarily on individual and interpersonal factors, omitting broader institutional or policy-level influences.

To address these limitations, future research should replicate this study across varied geographical and institutional contexts to enhance external validity. Employing stratified or random sampling can improve representativeness, while longitudinal designs can establish causality and track changes over time. Exploring moderating variables—such as teaching experience, workload, school type, or personality traits—would provide more nuanced insights. Incorporating objective measures, such as peer assessments or qualitative interviews, as part of data triangulation can help mitigate self-reporting biases and enhance the robustness of findings. Lastly, future studies should consider institutional and policy-level determinants—such as school climate, teacher autonomy, and compensation structures—to construct a more comprehensive framework for understanding and supporting TWB.

6 Conclusion

This study offers robust empirical evidence on how FLT's AP, CQ, and principals' TL interact to shape TWB in multilingual and multicultural educational settings. Findings confirm that both AP and TL positively influence TWB, with CQ serving as a key mediating variable. Teachers with greater adaptability are better positioned to manage the complexities of diverse classrooms, while TL fosters a supportive school environment conducive to teacher wellbeing. This study also advances existing literature by highlighting a reciprocal relationship: while CQ is often treated as a predictor of AP and TL, this research demonstrates that AP and TL can also enhance CQ. The mediation analysis confirms that CQ partially mediates the effects of both AP and TL on TWB, underscoring its importance as a personal

resource for navigating cultural and linguistic diversity. From a practical viewpoint, these findings support the integration of adaptability and CQ training into teacher development programs and the promotion of TL behaviors through leadership initiatives. Institutional efforts to cultivate these competencies can help mitigate burnout, improve job satisfaction, and enhance both teaching effectiveness and student outcomes. In conclusion, this study highlights the interdependent roles of AP, TL, and CQ in promoting TWB. By strategically fostering these attributes, educational institutions can create more resilient, inclusive, and empowering environments that benefit both teachers and learners.

Data availability statement

The original contributions presented in the study are included in the article/[Supplementary material](#), further inquiries can be directed to the corresponding author.

Ethics statement

All procedures performed in this study were in accordance with the ethical standards of Fakir Mohan University, Balasore, Odisha, comparable with other accepted ethical standards. The Ethics Committee of Fakir Mohan University, Balasore, Odisha approved this study. No names, addresses or other identifying information were used in the data analysis and dissemination of findings. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

RB: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. KR: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Resources, Software, Validation, Visualization, Writing – review & editing. AA: Conceptualization, Formal analysis, Investigation, Methodology, Project administration, Software, Supervision, Validation, Visualization, Writing – review & editing. SS: Investigation, Project

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Funding

The author(s) declare that no financial support was received for the research and/or publication of this article.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Generative AI statement

The author(s) declare that no Gen AI was used in the creation of this manuscript.

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Supplementary material

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/feduc.2025.1621041/full#supplementary-material>

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