



EFL Teachers' Adaptive Thinking: A Rasch Model-Based Validation

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ABSTRACT

Adaptability is an extremely valuable ability in teachers, particularly in schools with rigid curriculum and scarce resources. Even though all agree about its utmost importance, few investigations have been carried out in Iranian EFL teachers' adaptive thinking and behavior. To bridge this gap, we developed the PATS, an instrument that is culturally specific and drew from the Individual Adaptability Theory of Ployhart and Bliese (2006). PATS assesses six key areas: flexibility, creativity, problem-solving, analytical thinking, self-awareness, and self-regulation. We collected data from 150 Iranian EFL teachers, recording their age, gender, education level, and years of teaching experience. The final scale consists of 35 items, and its reliability was tested using the Rasch Rating Scale Model. Results demonstrated high reliability, with internal consistency (Cronbach's $\alpha = 0.92$) and person separation reliability (0.93). Principal Components Analysis confirmed unidimensionality, with 52.7% of the variance explained and the first contrast's eigenvalue below 2.0. All items showed good model fit. Person-item maps indicated that item difficulty aligned well with teacher ability levels, confirming the scale's effectiveness in distinguishing levels of adaptability. In general, PATS is a sound and a valid adaptive thinking measure for Iranian EFL instructors. In addition to measurement, it also starts professional growth and awareness; thus, adding adaptability training to teacher preparation courses might have an influence on responsiveness in teaching and motivation in different EFL settings.

KEYWORDS: Adaptive thinking; EFL teachers; Rasch model validation; Teacher adaptability; Persian adaptive thinking scale (PATS)

1. Introduction

Classrooms today display increased diversity which forces teachers to handle restricted resources in their work. The present educational environment demands greater flexibility because it requires immediate modifications. The practice of teacher flexibility entails modifying personal thoughts and emotions together with behavioral responses to classroom events in order to enhance student learning outcomes (Kheirzadeh & Sistani, 2018). Hiver and Dörnyei (2017) see flexibility as a responding dance of what they believe and practice, whereas Loughland and Alonzo (2018) point to the fact that it entails more scholarly achievement with innovative pedagogy. Flexibility comes in handy in Iran, particularly among the teachers of EFL, where the majority work in rigid, examination-oriented curricula and tend to have limited resources at their disposal. This compels instructors to develop innovative and forward-thinking answers to problems.

In addition, Ployhart and Bliese (2006) state that adaptive thinking is an ensemble of abilities such as creativity, problem-solving, self-awareness, managing one's own emotions, and classroom management abilities which become

increasingly important when the usual way doesn't fit. While we understand how important flexibility is in theory, we still have no research on how teachers think and behave adaptively in Iran. Right now, there isn't a reliable way to measure this skill in Iranian EFL teachers, making it hard to see how teachers can grow or improve. Because of this, chances to boost both teacher effectiveness and student success are often missed.

Accordingly, this study aims to change that by creating and testing a new Persian tool called the Adaptive Thinking Scale. The research scale uses Individual Adaptability Theory to adapt its design specifically for cultural environments in Iran. Rasch analysis measures six broad dimensions of adaptive thinking that incorporate flexibility, creativity when combined with problem-solving and analytical thinking, and self-awareness and emotional control. This research connects theoretical frameworks to practical assessment through its measurement tool and provides valuable recommendations for promoting adaptability in Iranian EFL learning environments.

2. Theoretical structure

In the present research, we report on Ployhart and Bliese's (2006) Individual Adaptability Theory (I-ADAPT), which reframes adaptability as a multidimensional capacity in the areas of cognition, affect, and behavior. At its core, I-ADAPT puts forth the value of managing change and complexity—traits which are a must in teaching, where uncertainty is the norm and not the exception.

Thus, we see that cognitive adaptability is the ability to reframe mental models and teaching strategies in the face of unexpected or new issues in the classroom. Practically, this may play out in the form of changing lesson plans on the fly when tech fails or when student interest takes an unexpected turn (Ployhart & Bliese, 2006). Also, emotional flexibility is the ability to moderate one's affective responses—to stay calm under stress, to bounce back from setbacks, and to put forth genuine concern for students' well-being (Lazzara, 2010). This is important for the maintenance of positive relationships between students and staff, and also in what we model in terms of resilience. We also see that behavioral adaptability is the adjustment of what we do as teachers—classroom management, pace, group work strategies, and to the ever-changing requirements of the situation at hand (Pulakos, 2000; Pulakos, 2019).

In I-ADAPT, adaptive thinking is presented as a key element of cognitive adaptability, which includes metacognitive regulation, situational awareness, and innovative problem-solving (Lazzara, 2010). To language teachers, adaptive thinking is the base for important processes like the support we give to groups of different ability levels, including culturally relevant material, and the quick transition between focused communication and form-based activities.

2.1. In the Iranian EFL setting

Iranian ELT professionals report that they are dealing with a range of issues, which include limited resources, a very centralized and dictated curriculum, and a focus on exams, which in turn reward memorization over communication and fluency. In this setting, the value of I-ADAPT is great. We see through the lens of I-ADAPT, which puts cultural factors at the fore, that Iranian teachers are not only reporting but also in the thick of these issues, which they, in turn, are transforming into chances for innovative teaching practices and improved student engagement.

2.2. Main aspects of adaptive thinking

A study of research which looked at adaptability in education reported six aspects which are related and which together present what we may term adaptive thought, in which teaching takes place:

1. **Flexibility:** The skill of modifying teaching methods and assessment to what the students and class need in that instant (Ingusci, 2019).
2. **Creativity:** The ability to come up with new methods of instruction, which may include designing context-based tasks or using low-tech alternatives when high-tech isn't accessible (Richards, 1994).
3. **Problem-solving:** Including a defined set of analysis procedures for the resolution of issues in the classroom, which range from student misconceptions to logistical issues (Parsons, 2012).
4. **Analytical:** Breaking out large-scale pedagogical issues into manageable components for evidence-based decision-making (Garner, 2009).
5. **Self-awareness:** Awareness of one's own cognitive biases, hot buttons, and deep-seated habits to enable ongoing professional development (Bilgin, 2018).
6. **Self-Regulation:** Mindful educators who practice cognitive restructuring and control of behavior indicate success in emotional regulation and concentration in the classroom. These techniques enable educators to develop learning environments that are calm and regulated with focused attention. (Holt, 2010).

Presented are current tools, which include the ELT Adaptive Thinking Scale by Zohoorian (2023), as a good starting point, but they are at times not culture and context-specific enough for Iranian settings. To that end, in our study, we developed and validated, via Rasch model analysis (Baghaei, 2008; Saghafi, 2021; Kianinezhad & Kianinezhad, 2025; Pishghadam &

Khajavy, 2014), the Persian Adaptive Thinking Scale (PATs), which we put forth as a way to present the ways in which Iranian teachers display adaptability across these six dimensions.

3. Literature review

In the void of research which looks into what adaptive thinking is, we have also seen this in the case of Iranian English as a Foreign Language (EFL) instructors. To fill in this gap, our study has designed and validated the Persian Adaptive Thinking Scale (PATs), which we put forth as a tool to measure adaptive thinking in a culture and its context, which in turn reflects the issues that Iranian teachers do in fact face.

3.1. Characterization of teacher adaptive thinking

Teacher adaptive thinking is a very in-depth concept that goes beyond impulsive decision making or instinctive reactions to issues in the classroom. Instead, it is a developed process that includes intentional reflection, analysis of issues, and strategic changes to teaching methods. The study conducted by Kim and Kim (2022) defines adaptive instruction as intentional responses to both unusual classroom situations and diverse student requirements. The report confirms these practices emerge from deliberate planning instead of unplanned or momentary choices. This is what we see in the case of “adaptive expertise,” as put forth by Ebby et al. (2023), which is to reflect on and respond to students’ developing understandings. Also, Brownlee et al. (2017) a very important ability for novices in the classroom as they try to deal with the many variables present in a live setting. Also, Brownlee (2017) report on the value of “reflexive thinking,” that which forms the base of situational analysis and in which intentional pedagogy is built.

Although we do not see the term “adaptive thinking” put forth consistently in educational research, related ideas are brought up often. Responsive teaching which includes adjusting instruction to what students are getting out of it and flexible teaching which is about which methods work best for different learning styles are at the base of adaptive thinking (Khan, 2016). We require an integrated model to inform future practice and research.

3.2. Three issues which influence teachers’ adaptive thinking

Personality and environmental traits affect teachers’ approach. The core personality traits that play a major role consist of reflective practice alongside cognitive flexibility and PCK and accumulated experience. Teachers evaluate themselves to identify areas for improvement and improve teaching (Kim & Kim, 2022). Cognitive flexibility allows them to react properly to unexpected circumstances and students’ varied needs. The combination of PCK and hands-on experience enables people to make informed decisions which suit specific situations.

Quirk and Chumley (2018) list metacognitive awareness, emotional control, and strategic response as essential elements of adaptive learners—building blocks of good pedagogy. Strategic thinking and self-regulation are how they frame the foundation of adaptive expertise. The environment together with institutional elements play a major role in shaping how adaptable students become. The implementation of inflexible policies together with excessive standardization impedes innovation but environments that support collaboration promote experimentation and growth (Kim & Kim, 2022). According to Ebby et al. (2023), professional learning groups facilitate reflective conversation and solving problems. Adaptive instruction is reliant on responsive leadership and adaptive organization. Research in the future needs to investigate how collaboration, school systems, and individual characteristics impact adaptive thinking.

3.3. Impact of teachers’ adaptability on pupils’ learning

Empirical studies report a strong and positive relationship between teachers’ adaptive thinking and student learning outcomes. In a report by Kim and Kim (2022), adaptive teaching approaches are shown to improve academic performance and student engagement. Adaptive instruction helps students succeed because it delivers individualized teaching methods which match their learning approaches. Thus, adapted instruction proves effective in real-world classrooms.

Also, in terms of professional development, adaptive expertise is a central element. In a study by Kim and Kim (2022), we see that adaptive teaching practices support teachers’ development of their skills, push them into a lifelong learning practice, and at the same time play a role in the development of a strong professional identity. Also, through the process of continuous reflection and pedagogical adjustment, teachers’ competencies grow, which in turn helps them better respond to the ever-changing educational environment. According to Morris (2018) autonomous learning develops best through teaching approaches which enable students to become independent learners while also encouraging reflective thinking.

In spite of growing research (e.g., Astuti et al., 2022; Granziera, 2024; Singh, 2025; Ivanov et al., 2025), there is still more to be resolved about the connection between teacher flexibility and student performance. More research is necessary in order to define winning approaches, suitable locations, and the most recipient students. Long-term studies across many years are also required to establish enduring impacts on student performance.

4. Methodology

4.1. Participants and setting

To develop and validate the Persian Adaptive Thinking Scale (PATS), a total of 150 Iranian EFL teachers were included in the study. A mixed method of convenience and random sampling was employed to ensure a broad range of participants while maintaining logistical feasibility. The sample size was carefully selected based on Linacre's (1994) recommendation of participant-to-item ratio to ensure result stability in applying the Rasch model. The study attempted to align strict statistical requirements with real field circumstances and eventually came up with valid psychometric instruments. Participants were an Iranian community representative cross-section of EFL teachers, diverse demographics, and working experiences. Academic background ranged from Associate's Degree (AA) to Ph.D., and teaching experience ranged from less than two years to more than two decades. The sample was representative of an adequate age distribution, as they were teachers from every phase of their careers. The sample had a balanced sample of both male and female to enhance the generalizability of the results to male and female EFL teachers. The participants were all Iranian nationals and native speakers of Persian, thus adhering to content, language, and context of the instrument. This alignment was employed to decrease construct-irrelevant variance and enhance the ecological validity of the PATS. Data were gathered in February and March 2025 via an online platform. Ethical issues were dealt with at all levels of data collection. The study participants received complete information about study goals and procedures along with risk and benefit details and their participation rights including voluntary involvement. Every person in the study signed an informed consent form before joining and researchers replaced all personal information with code numbers to maintain participant confidentiality. All research procedures followed both institutional ethical requirements and worldwide research standards.

4.2. Measure development

The Persian Adaptive Thinking Scale (PATS) was developed by us as a tool which is at once culturally tuned in and strong from a psychometric standpoint for the measurement of six key elements of adaptive thinking in EFL teaching professionals. These elements, includes, flexibility, creativity, problem solving, analytic thinking, self-awareness, and control of emotions, we identified through an extensive review of both theory and research (i.e., Ployhart & Bliese, 2006; Collie & Martin, 2016; Albrecht, 2009; Kim & Pierce, 2013; Holt & Rainey, 2002; Cavanaugh & Blanchard-Fields, 2018). An initial pool of 40 items was compiled using a deductive item development approach based on pre-existing conceptual definitions for each dimension. The item bank was then sifted through by specialist panels that featured psychometrics, psychology, and language instruction. Items that were unclear, redundant, or culture-specific and out of place were removed or revised. Culture-specific items that were ambiguous, redundant, or inappropriate were removed or revised. The final tool consisted of 35 well-calibrated items clearly mapping to the six theoretical constructs. The survey was divided into two parts. Section I requested demographic and background information, including age, gender, academic degree, and years in the teaching field. Section II contained the 35 core items, which consisted of statements defining a behavior, disposition, or cognitive act characteristic of adaptive thinking. The participants expressed their level of agreement through a five-point Likert scale which ranged from 1 (strongly disagree) to 5 (strongly agree). To reduce misunderstanding and confusion, all content was presented in standard Persian, avoiding reverse coding and negative wording. A short and unelaborated scoring system was employed, and the scores were easily interpretable and amenable to psychometric evaluation. Pilot testing with 10 teachers in the first instance was performed to assess face validity, linguistic precision, and general clarity of items. The feedback from this stage was applied to refine the instrument, which later worked well when given on a wider scale.

4.2.1. Scale adaptation

PATS underwent a thorough development process to guarantee its cultural and linguistic appropriateness. The study employed a forward-back translation approach (Brislin, 1986). Original variables were initially translated into Persian by groups of bilingual professionals. The Persian translation was subsequently reversed into English by another group of bilingual professionals to verify translation accuracy. Conceptual equivalence was achieved through this iterative process. To improve contextual relevance, the scales were reviewed by three experts in psychometrics, psychology, and language instruction. Based on their input, the scale was refined from a larger pool of items down to 35. These experts also looked at the scale's relevance for use in Iranian settings in English as a second language instruction. We made changes based on their input which also covered language and culture specific to Iran. The final scale effectively captured the concept of adaptive thinking within the local context.

4.2.2. Constructs and sample items

Flexibility, Creativity, Problem Solving, Analytical Thinking, Self-Awareness, and Self-Regulation were examined through five items based on related theory and practical relevance. Many items were adapted from established models and tools, while a few were specifically developed for this research to address issues related to the context of Iranian EFL teachers.

4.2.3. Construct definitions

1. **Flexibility:** The capability to adjust teaching approaches based on unanticipated classroom variables and learner requirements.

I adapt my teaching strategies promptly to address challenges common in Iranian EFL classrooms, such as large class sizes or insufficient resources. (Researcher-developed)

I revise my teaching goals to accommodate significant differences in students' English proficiency levels, ensuring equitable learning opportunities (Holt & Rainey, 2002)

I incorporate relevant, spontaneous ideas, such as Iranian cultural references or current events, into my lessons to increase student engagement (Albrecht, 2009)

I treat unexpected challenges, like power outages or technological disruptions, as opportunities to apply creative problem-solving in teaching (Researcher-developed)

I switch smoothly between different teaching methods, such as moving from lectures to group work, without compromising lesson objectives (Cavanaugh & Blanchard-Fields, 2018)

I quickly adjust my lesson pacing based on students' real-time comprehension and engagement cues (Researcher-developed)

2. **Creativity:** The capability to develop original educational strategies which boost student engagement in learning processes.

I design original activities based on Iranian cultural themes to make complex or abstract language concepts easier to understand (Raybourn, 2005)

When traditional methods, such as drills, are ineffective, I implement innovative alternatives, like communicative or task-based teaching (Kim & Pierce, 2013)

I encourage students to explore non-traditional language learning tools, such as Iranian-language media, digital applications, and creative tasks (Researcher-developed)

I design activities that cater to multiple learning preferences, ensuring engagement for auditory, visual, and kinesthetic learners (Cojocar, 2012)

I use creative strategies, such as culturally appropriate games or collaborative projects, to address classroom management challenges (Raybourn, 2005)

I design novel tasks where students use English to explore or present aspects of contemporary Iranian culture or innovations (Researcher-developed)

3. **Problem-Solving:** The capacity to recognize educational challenges and develop effective solutions for teaching problems.

I analyze classroom challenges, such as group dynamics or communication breakdowns, from multiple perspectives to identify the most effective solutions (Tracy, 2014)

I interpret ambiguous situations in the classroom, such as mixed or unclear responses, and adjust my teaching style accordingly (Researcher-developed)

I anticipate potential challenges, like student demotivation, and develop preemptive strategies to sustain engagement and participation (Kim & Pierce, 2013)

I collaborate with colleagues to solve persistent teaching problems, such as making lessons more interactive and student-centered (Cojocar, 2012)

I plan ahead to mitigate common issues in Iranian EFL classrooms, such as dealing with distractions or addressing language learning gaps (Albrecht, 2009)

I systematically investigate the underlying reasons for recurring difficulties Iranian students face with specific English pronunciation or intonation patterns (Researcher-developed)

4. **Analytical Thinking:** The capability to decompose complex pedagogical problems into manageable components and make evidence-based instructional decisions.

I assess the success of my teaching methods by monitoring students' ability to comprehend and apply the content in real-world contexts (Holt & Rainey, 2002)

I identify recurring patterns in student errors and use them to revise and optimize my teaching strategies (Researcher-developed)

I rely on diverse student assessments, including oral presentations and written tests, to refine my teaching approaches for better outcomes (Cavanaugh & Blanchard-Fields, 2018)

I incorporate established language teaching theories, such as communicative language teaching or task-based instruction, into my everyday practice (Kim & Pierce, 2013)

I apply logical reasoning to plan step-by-step lessons, such as introducing grammar rules in progressive, clear stages (Researcher-developed)

I critically assess the alignment of curriculum goals with the actual linguistic needs and future aspirations of my Iranian EFL students (Researcher-developed)

5. **Self-Awareness:** Awareness of self in terms of strengths, limitations, and culture's role in teaching.

I consistently reflect on my teaching practices to identify and address gaps in the delivery of language skills instruction (Gube & Lajoie, 2020)

I recognize the influence of my Iranian cultural background on my teaching methods and how it shapes my interaction with students (Researcher-developed)

I actively seek constructive feedback from students and peers to enhance my teaching effectiveness and language instruction skills (Kim & Pierce, 2013)

I maintain awareness of my emotional state to ensure it fosters a positive and productive learning environment (Tracy, 2014)

I reflect on both my strengths and limitations as an EFL teacher and use this awareness to guide my professional growth (Researcher-developed)

I often reflect on how my own educational background and teaching philosophy influence my interactions with Iranian students and their learning (Researcher-developed)

6. **Self-Regulation:** Emotional control and professionalism in difficult teaching scenarios.

I manage my emotions effectively during stressful classroom moments, such as during exams or disciplinary challenges, to maintain a calm environment (Albrecht, 2009)

I handle conflicts with students professionally and respectfully, fostering an inclusive environment that values mutual understanding and promotes positive student-teacher relationships (Dobbins & Pettman, 2007)

I regulate my emotional responses to prevent disruption, particularly when dealing with misbehavior or unanticipated setbacks (Researcher-developed)

I avoid making impulsive decisions when faced with classroom challenges, such as clarifying misunderstandings with careful, deliberate adjustments (Tracy, 2014)

I stay focused on students' overall language proficiency goals rather than reacting emotionally to temporary setbacks in their progress (Cojocaru, 2012)

4.2.4. Process of validation

The study evaluated psychometric properties by validating the latest 35-item PATS version through multiple steps which tested face and construct validity and reliability and unidimensionality. In the pilot study, which included a small group of 10 English as a Foreign Language teachers, we evaluated the item pool. We received qualitative feedback on the items' clarity, relevance, and overall comprehensibility. Based on their input, we made a number of lexical and syntactic changes, which mainly included the clarification of cultural references and improved readability.

Subsequently, after making those changes, we administered a larger-scale version of the revised scale to 150 Iranian English as a Foreign Language teachers. This data was analyzed via Rasch analysis, following the Rating Scale Model, chosen for its proven performance with polytomous Likert-like data and its ability to analyze item functioning at an interval level. As reported by Kowal (2024), in this study, Rasch analysis examined the following main parameters:

- **Item and Person Fit Statistics:** To determine if each item performed as expected in the model and if participants responded to the scale consistently.
- **Category Functioning:** To assess whether respondents were using the Likert scale as intended.
- **Indices for Reliability:** To evaluate item content coverage across the range of the trait and to assess the scale's ability to differentiate between high and low adaptive thinkers.
- **Unidimensionality:** Principal Component Analysis (PCA) was used to confirm whether the Persian Adaptive Thinking Scale (PATS) measures a single construct. This also allowed us to determine whether second-order traits not aligned with the primary category of adaptive thinking were present. The absence of such traits in the data provided empirical support for the unidimensionality of the instrument.

4.2.5.Study design and data analysis

In this research, a quantitative cross-sectional survey was used to study Iranian EFL teachers' adaptive thinking skills. Data was collected at a single point in time through an organized online survey, which allowed for comprehensive and time-efficient analysis of teachers' reported cognitive and behavioral flexibility across various educational settings in Iran.

First, preliminary statistical analyses were conducted using IBM SPSS Statistics Version 24 for screening and determining initial psychometric properties. The researcher used descriptive statistics to describe the characteristics of our participants together with their individual responses. This helped present a comprehensive view of the sample and assess the data distribution. Skewness and kurtosis measures were also verified to ensure normality of distribution, which confirmed the appropriateness of data for parametric analysis and guaranteed the distribution assumptions.

The study also examined internal consistency, which we measured using Cronbach’s alpha. This was calculated for the full scale: flexibility, creativity, problem solving, analytical thinking, self-awareness, and self-control. A Cronbach’s alpha value greater than 0.70 was considered to indicate that the items comprising each construct demonstrated strong internal consistency. Next, in the second stage, we further analyzed the scale’s psychometric soundness using the Rating Scale Model (RSM) framework through Rasch analysis conducted with Winsteps software. This allowed for a detailed item-level performance assessment, which is essential for validating the instrument through precise measurement. And thus, the researcher assessed the following four key areas:

- 1. Item Fit: We reviewed each item to see how well it conformed to the expectations of the Rasch model. Items that didn't fit properly were flagged for further examination. Ignoring such misfits could lead to biased results and compromise the accuracy of measuring the underlying construct.
- 2. Person Fit: The research examined participant responses to identify any response patterns that showed signs of unreliability. This process validates our dataset integrity while making sure the model generates trustworthy insights.
- 3. Category Performance: The researchers evaluated the five-point Likert scale to see if participants followed the intended response categories. Specifically, we checked if the categories followed a logical order and effectively differentiated different levels of adaptive thinking.
- 4. Item and Person Reliability: Reliability scores were calculated to evaluate how consistent and stable the measurement tool is. High item reliability suggests that the assessment reliably measures adaptive thinking across different items, while high person reliability indicates it can accurately distinguish individuals with varying levels of adaptive thinking.

In the third and final phase, therefore, the researcher tested the key Rasch measurement assumption of unidimensionality. To assess unidimensionality, the study conducted a Principal Component Analysis (PCA) of standardized residuals. This method helped determine whether a single dominant factor was present, as expected in a unidimensional instrument designed to measure adaptive thinking. We interpreted an eigenvalue of less than 2.0 in the first contrast and more than 40% variance explained by the Rasch dimension as support for unidimensionality.

5. Results

5.1. Preliminary analyses

In this section, preliminary analyses, including descriptive statistics, normality checks, and then, reliability and validity analysis, are presented.

5.2. Descriptive statistics

Table 1 presents the descriptive statistics which include the total scores from PATS scale 35 items. The table includes the sample size (N), minimum, maximum, mean, standard deviation, and variance. Each of the 150 Iranian EFL teachers provided responses which were combined into total scores across 35 items. The average total score for the scale reached 123.45 with an accompanying standard deviation of 15.32 to show moderate response variability. The lowest recorded score stood at 89 and the highest reached 162 showing wide response distribution and PATS scale achieved a Cronbach’s alpha reliability value of 0.92 which indicates high internal consistency.

Table 1.
Descriptive Statistics for PATS Scale (N = 150)

Statistic	N	Minimum	Maximum	Mean	Std. Deviation	Variance
Total Score (PATS)	150	89	162	123.45	15.32	234.70

5.3. Checking normality

The distribution of PATS scale sum scores required both skewness and kurtosis measurements to determine normality. Skewness measures the degree to which data distribution is symmetrical while kurtosis shows if data points form peaks or flat patterns. A score of 0 in skewness or kurtosis indicates perfect normality but scores within ± 1 are excellent and scores within ± 2 are adequate according to George and Mallery (2010) and Ryu (2011) and West (1995). Table 2 presents the total score skewness of PATS scale which reached -0.45 (SE = 0.20) indicating excellent results. The kurtosis measurement was -0.62 (SE = 0.40), also in acceptable values. The data showed normal distribution according to these results.

Table 2.

Tests of Normality for PATS Scale (N = 150)

Statistic	Skewness	Std. Error (Skewness)	Kurtosis	Std. Error (Kurtosis)
Total Score (PATS)	-0.45	0.20	-0.62	0.40

5.4. Validation

5.4.1. Rating scale category structure

Category structure of Rating scale of PATS scale was investigated through the Rasch Rating Scale Model presented by Andrich (1978), WINSTEPS program developed by Linacre (2017). Five-point Likert response categories employed in this study were: 1 = "strongly disagree," 2 = "disagree," 3 = "somewhat agree," 4 = "agree," and 5 = "strongly agree." Table 3 displays the observed averages, fit statistics (infit mean squares and outfit mean squares) and Andrich thresholds for the five response categories. The observed average reflects the mean measure of all respondents who selected a given category. Observed averages need to follow an increasing pattern through different categories because this pattern ensures that higher response levels accurately reflect higher levels of the latent trait.

Accordingly, the infit and outfit mean squares indicate the extent to which each category fits the expectations of the Rasch model. Expected values are close to 1.0, and values exceeding 1.5 may indicate unexpected or problematic responses within the category (Linacre, 2009; Baghaei & Shoahosseini, 2019). All categories in the PATS scale showed infit and outfit mean-square values within the acceptable range, suggesting appropriate functioning of the categories. The Andrich thresholds represent the points on the latent continuum where the probability of selecting a given category and the next higher category are equal. For a well-functioning rating scale, Andrich thresholds should increase in a logical, sequential order. In the current analysis, the thresholds were estimated as follows:

- Threshold 1: -2.10
- Threshold 2: -0.75
- Threshold 3: 0.55
- Threshold 4: 1.90

Accordingly, these results demonstrate that the thresholds increased progressively, indicating no disordered categories. Respondents were able to differentiate between adjacent response options effectively. The results of the category structure analysis show that the five-point Likert scale used in the PATS scale is well-defined, with ordered thresholds, appropriate fit statistics, and monotonic increases in observed averages. No modifications to the rating scale are necessary.

Table 3.

Summary of Category Structure for the PATS Scale

Category	Observed Average	Infit MNSQ	Outfit MNSQ	Andrich Threshold
1 (Strongly Disagree)	-1.45	1.01	1.03	-2.10
2 (Disagree)	-0.75	0.97	0.99	-0.75
3 (Somewhat Agree)	0.25	1.02	1.01	0.55
4 (Agree)	1.20	0.98	0.95	1.90
5 (Strongly Agree)	2.15	0.96	0.94	-

5.4.2. Item measures and fit values

The item measures and fit values for the 35 items of the PATS scale are presented in Table 4. The "Measure" column represents item difficulty estimates, measured in logits. Higher values show harder items (harder to agree on), and lower values show easier items (easier to agree on). The "S.E." column is the standard error of the measure, or the reliability of item difficulty estimation. Low standard errors show high precision in item difficulty estimation. Item difficulty varied from -1.25 logits (Item 10, the simplest item to support) to 1.65 logits (Item 22, the most difficult item to support). This variation indicates that the scale contains items of varying difficulty that are suitable for measurement of a wide variety of adaptive thinking levels. Infit and outfit MNSQ values determine the item fit to the Rasch model. All the items were within target range, indicating proper measurement of the targeted construct. Optimal fit statistics are between 0.60 and 1.40, and estimates are best close to 1.0. Misfitting items contribute construct-irrelevant variance and must be respecified or deleted (Baghaei, 2008). Point-measure correlation (PT-Measure Corr.) indicates quality of each item's match with total score; positive scores validate construct relevance. Rasch person separation reliability was 0.93, indicating high reliability in distinguishing adaptive thinking levels.

Table 4.

Item Measures and Fit Statistics for the PATS Scale

Entry Number	Measure	S.E.	Infit MNSQ	Outfit MNSQ	PT-Measure Corr.
1	0.25	0.08	1.05	1.02	0.52
2	-0.65	0.07	0.92	0.94	0.49
3	0.10	0.07	1.12	1.10	0.50
4	-0.30	0.08	0.87	0.89	0.56
5	0.50	0.08	1.03	1.00	0.54
6	-0.45	0.07	1.00	0.98	0.51
7	0.85	0.08	1.06	1.05	0.48
8	-0.15	0.07	0.94	0.92	0.55
9	1.00	0.09	1.08	1.07	0.47
10	-1.25	0.06	0.88	0.91	0.58
11	0.40	0.08	1.04	1.01	0.53
12	-0.80	0.07	0.97	0.96	0.50
13	0.60	0.08	1.02	1.03	0.52
14	-0.35	0.07	0.90	0.92	0.57
15	0.75	0.08	1.10	1.08	0.49
16	-0.60	0.07	0.95	0.94	0.51
17	1.25	0.09	1.12	1.11	0.46
18	-0.20	0.07	0.93	0.91	0.55
19	0.95	0.08	1.09	1.06	0.48
20	0.15	0.07	1.07	1.05	0.51
21	-0.75	0.07	0.89	0.88	0.56
22	1.65	0.10	1.15	1.13	0.44
23	-0.10	0.07	0.96	0.95	0.53
24	0.30	0.07	1.02	1.01	0.54
25	-0.40	0.07	0.91	0.93	0.55
26	1.10	0.08	1.08	1.06	0.47
27	-0.50	0.07	0.94	0.91	0.52
28	0.55	0.08	1.04	1.03	0.53
29	-0.65	0.07	0.90	0.92	0.54
30	0.80	0.08	1.05	1.03	0.50
31	-0.25	0.07	0.97	0.96	0.53
32	1.45	0.09	1.14	1.12	0.45
33	-0.85	0.07	0.89	0.88	0.57
34	0.20	0.08	1.01	1.02	0.52

Entry	Number	Measure	S.E.	Infit	MNSQ	Outfit	MNSQ	PT-Measure	Corr.
	35	1.50	0.09	1.13		1.11		0.46	

5.4.3. Dimensionality

To examine the issue of unidimensionality in the PATS scale, we conducted a Principal Components Analysis of Standardized Residuals (PCASR), which we carried out using the Rasch Rating Scale Model (Andrich, 1978) in the WINSTEPS software (Linacre, 2017). This analysis provides us with a tool to determine whether what is explained by the Rasch dimension is, in fact, substantially greater than what is explained by any other additional dimensions present in the residuals. The study also followed the guidance of Linacre (2009), which states that what is accounted for by the Rasch dimension should be a minimum of 40%, and that the first contrast in the residuals should account for less than 5% of unexplained variance, which in turn should have an eigenvalue of less than 2.0. This indicates there is no large secondary dimension.

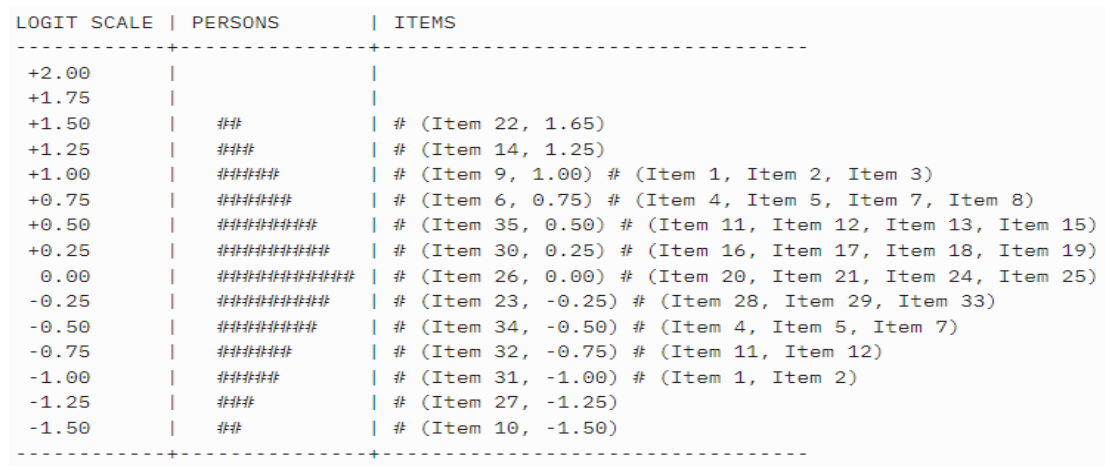
In this analysis, we saw that 52.7% of the raw variance was explained by the Rasch dimension, which is above the recommended cut point. This indicates that there is a strong latent trait present. We also noted that the first contrast's eigenvalue in the residuals was 1.86, accounting for 4.3% of the unexplained variance, which suggests that there is some residual structure present, but it is not robust enough to dismiss the unidimensionality assumption. This supports what was put forth by Tennant and Pallant (2006), who reported that unidimensionality is a viable option when secondary dimensions do not display strong support. It was also found that item fit statistics supported unidimensionality. Accordingly, as mentioned earlier, all 35 items fell within the acceptable range of 0.60 to 1.40 for infit and outfit mean square values (Bond & Fox, 2015) and also reported positive, consistent item-person correlations. This shows a very strong association with the expectations of the Rasch model. Additionally, the minimal residual variance in the first contrast and strong item fit further support that the PATS scale demonstrates solid unidimensionality for the purposes of Rasch modeling.

5.4.4. Item-person map

Figure 1 presents a Wright Map, illustrating the relationship between person ability estimates and the 35 item difficulty parameters within the Adaptive Thinking construct. On the right side, the map displays item difficulties, representing how challenging or acceptable each item is. The left side depicts the distribution of individuals based on their estimated ability levels. Items positioned higher on the logit scale are more difficult to endorse, while those positioned lower are comparatively easier. Similarly, individuals located toward the top of the distribution demonstrate higher levels of Adaptive Thinking, whereas those at the bottom exhibit lower levels. The logit scale ranges from -1.5 to $+2.0$, capturing item difficulties from approximately -1.50 logits (easiest; Item 10) to $+1.65$ logits (most difficult; Item 22). The distribution of persons follows an approximately normal curve, peaking near 0 logits, indicating that most individuals exhibit average levels of Adaptive Thinking, with fewer found at the extremes.

Accordingly, this person distribution aligns well with item difficulties, the majority of which are clustered between -1.0 and $+1.0$ logits. This suggests good targeting of the test, as most individuals are well-matched to item difficulty levels. Higher ability respondents above $+1.0$ logits show greater support for challenging items such as Item 22 which has a difficulty rating of $+1.65$. Respondents with lower ability scores below -1.0 logits tend to choose simpler items like Item 10 which has a difficulty level of -1.50 . The PATS Scale demonstrates its capability to measure Adaptive Thinking at different ability levels through this proper item-response relationship. In this figure, within the PERSONS distribution, each hash mark ('#') represents approximately seven individuals, based on a total sample size of 150. This symbolic representation visually illustrates the spread of person abilities along the logit scale. On the ITEMS side, each '#' denotes a single test item, placed at its estimated difficulty level. These item difficulties were derived using Rasch model analysis, which maps both person abilities and item challenges on a shared logit scale, enabling direct comparison. Lastly, for this analysis, Items 1 through 33 excluding any specifically noted exceptions are assumed to be uniformly distributed across a difficulty range of -1.0 to $+1.0$ logits. This assumption ensures a balanced distribution of item difficulty, facilitating fair assessment across the full range of person abilities.

Figure 1.
Wright map of the distribution of persons and items on the latent variable



6. Discussion

As mentioned earlier, this study aimed to develop and validate the Persian version of the Adaptive Thinking Scale (PATs) among a sample of 150 Iranian EFL teachers, employing Rasch model analysis for psychometric evaluation (e.g., Aryadoust et al., 2016; Baghaei et al., 2017; Borsboom et al., 2004; Pishghadam et al., 2020; Kianinezhad & Kianinezhad, 2025; Nadri et al., 2019; Saghafi et al., 2021; Elahi Shirvan et al., 2016; Zeraatpishe & Hosseindoost, 2025). Addressing this gap is critical, as no tool has previously been specifically designed to assess adaptive thinking within the Iranian educational context. The Persian PATs version contains 35 items which base their content on the Individual Adaptability Theory (I-ADAPT) established by Ployhart and Bliese in 2006. The assessment scale uses a five-point Likert scale which starts from 'Strongly Disagree' (1) to 'Strongly Agree' (5).

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The teaching staff in Iran especially those who teach languages face classroom situations that differ from other professional settings. The study by Kim and Kim (2022) demonstrates that adaptive teaching needs teachers to practice reflection while making purposeful choices about instructional approach modifications. This concept mirrors adaptive expertise which proves essential for tackling inflexible curricula together with classrooms under pressure from exams and scarce educational resources. The PATs evaluates six essential adaptive thinking components which include flexibility alongside creativity along with problem-solving abilities and analytical capabilities and self-awareness and self-regulation to measure challenges faced by Iranian EFL teachers. The scale demonstrated psychometric excellence through a Cronbach’s alpha of 0.92 combined with strong person reliability according to Ployhart and Bliese’s (2006) framework.

Rasch analysis further validated the scale, showing appropriate item functioning, logical progression, and acceptable fit statistics. Dimensionality checks supported unidimensionality (52.7% explained variance, eigenvalue = 1.86), and the Wright Map confirmed item-person alignment. The findings demonstrate that adaptive thinking remains essential for teaching practices particularly within educational systems that restrict learning methods such as Iran’s. Kim and Kim (2022) and Ebby (2023) emphasize that flexible environments support the growth of adaptive expertise, while rigid systems inhibit it. Quirk and Chumley (2018) stated that individual traits including metacognition along with experience and institutional support work together to develop adaptability. The implementation of adaptive thinking methods leads to better teacher performance and generates positive results for student participation and academic results and the classroom atmosphere.

7. Conclusion

This research successfully created and tested the Persian Adaptive Thinking Scale among Iranian EFL teachers. By employing Rasch analysis, the instrument demonstrated strong psychometric properties, including internal consistency, unidimensionality, and meaningful item functioning. Research demonstrates that adaptive thinking functions as a quantifiable multiple-dimensional construct which acts as an essential basis for successful teaching in flexible educational settings which frequently contain limiting factors. Pedagogical implications are quite substantial. The PATs functions as a twofold instrument which educators can use in their teacher education programs for assessment and development. The instrument provides educational leaders and teacher trainers with a tool to detect developmental needs so they can build specific professional development initiatives which encourage reflective teaching approaches.

The implementation of practical methods should start with flexibility workshops and emotional control training and require pre-service students to learn adaptive thinking and establish mentoring systems where experienced teachers mentor new teachers. This research presents certain constraints which need to be considered. The research sample contained EFL teachers from diverse backgrounds yet it consisted solely of Iranian educators and self-report data collection may lead to participant bias. The scale could benefit from supplementary evaluation methods which use observational or performance-based approaches in future research. Future research should investigate how adaptive thinking develops over time while studying its connection to student results and its association with institutional characteristics such as flexible policies and teacher decision-making autonomy. Research efforts should conduct validation tests of the scale in different cultural environments because it will enhance its use beyond Iranian educational settings.

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