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Enhancing EFL Teachers' Noticing of Critical Thinking Through Video Tagging

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Abstract

Despite the recognized importance of critical thinking (CT) in EFL instruction, teachers often struggle to identify and respond to CT moments in real-time classroom interactions. This gap between theory and practice underscores a need for targeted professional development. This study represents the first investigation of how a structured video tagging program, grounded in Jewell's Reasoning Taxonomy, enhances experienced EFL teachers' noticing and interpretation of learners' CT behaviors. Using a mixed-methods design, thirty experienced EFL teachers (5+ years' experience) completed a six-week program and were divided into experimental (video tagging) and control groups. Data from pre/post tagging tasks and semi-structured interviews were analyzed quantitatively and thematically. The experimental group showed a significant increase in both the quantity and interpretive quality of identified CT instances compared to the control group. Teachers developed a more nuanced understanding, shifting from superficial behavioral descriptions to detailed analyses of student reasoning processes like inference, evaluation, and problem-solving. The findings advocate for integrating such explicit noticing tasks into teacher training curricula to bridge the gap between CT theory and classroom practice, ultimately enriching pedagogical reasoning and fostering more adaptive, responsive teaching.

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Introduction

Fostering critical thinking is a hallmark of effective EFL instruction, yet teachers often struggle to recognize and respond to learners' critical thinking moments in real-time. While adaptive teaching, characterized by thoughtful adjustments to meet student needs (Anders, Hoffman, & Duffy, 2000; Hoffman & Pearson, 2000), is widely recognized as ideal, research on how EFL teachers specifically notice and interpret critical thinking in their students remains limited. Noticing these critical thinking moments is crucial for effective adaptive teaching because it allows teachers to tailor their instruction to build upon and extend students' reasoning skills.

Imagine an EFL student grappling with an ambiguous text, carefully weighing different interpretations before formulating an argument. Does the teacher notice this display of critical thinking, and how does their interpretation of this moment shape their subsequent instruction? The ability to recognize these 'critical thinking moments' is crucial, as critical thinking equips EFL learners with the ability to analyze information, evaluate arguments, and form reasoned judgments in a non-native language (Dwyer, 2017).

Previous research emphasizes the importance of teachers attending to students' ideas and reasoning (Ball, Lubienski, & Mewborn, 2001; Franke et al., 2009) and making thoughtful in-the-moment decisions (Ball, 1993; Fennema et al., 1996; Franke & Kazemi, 2001). However, the complexities of this decision-making process, particularly in the context of EFL and critical thinking, remain under-explored (Rodgers et al., 2016; Soleimani & Aghazadeh, 2024). This lack of understanding hinders the development of effective teacher training programs and limits teachers' ability to foster critical thinking skills in their students (Yazdankhah et al, 2022). If teachers are not equipped to recognize and respond to critical thinking in action, opportunities to cultivate these essential skills may be missed.

The present study addresses a critical gap in the literature by introducing a novel approach to enhancing teacher noticing of critical thinking through structured video tagging. While previous research has explored teacher noticing in general education contexts, this investigation is the first to integrate Jewell's Reasoning Taxonomy with ELAN video tagging software specifically for EFL teachers, providing both a theoretical framework and practical tool for developing this essential skill. This innovative approach offers a scalable solution to the persistent challenge of bridging critical thinking theory with classroom practice in language education.

Purpose and Research Questions

To address this gap, this study aims to investigate the impact of explicit noticing practices via video tagging on EFL teachers' ability to notice and interpret learner CT. Specifically, it seeks to answer the following research questions:

1. To what extent does explicit noticing practice via video tagging improve the quantity of critical thinking instances identified by experienced EFL teachers?
2. To what extent does it improve the interpretive quality of their observations, as measured by alignment with a reasoning taxonomy and depth of description?

3. How does the intervention influence the relationship between what teachers notice and how they interpret it?

Literature Review

Defining Critical Thinking in EFL

Critical thinking is defined as the ability to analyze information and evaluate arguments (Dwyer, 2017). In EFL, it is crucial not only for mastering linguistic skills but also for developing the capacity to think critically in a non-native language (Atkinson, 1997). This involves skills such as analyzing authentic texts for bias, participating in debates on global issues, and writing argumentative essays that demonstrate reasoned perspectives.

Research indicates that critical thinking skills are positively correlated with EFL learners' writing abilities (Stapleton, 2001) and overall academic performance (Lai, 2011). For example, Susilawati, Yundayani, and Chairunnisa (2019) found that encouraging EFL learners to question assumptions in texts led to more persuasive and well-reasoned arguments in their writing. However, while these outcomes are desired, the pedagogical pathway to achieving them---particularly through teacher-mediated classroom interaction---is less clear.

Teacher Cognition and Critical Thinking: Challenges

Despite its recognized importance, a significant gap persists between theoretical endorsement of CT and its practical application in EFL classrooms (Egege & Kutieleh, 2004). Many teachers struggle to effectively integrate critical thinking due to a lack of deep understanding, practical strategies, or clarity on what CT "looks like" in student language production (Kurfiss, 1988).

Teacher cognition---encompassing beliefs, knowledge, and thought processes---fundamentally shapes instructional practices (Borg, 2003; Behzadi & Rashidi, 2023). Teachers' epistemological beliefs about language learning can significantly constrain or enable their ability to recognize and foster CT. For instance, a teacher viewing language learning primarily as memorization may undervalue or overlook student reasoning, whereas a teacher focused on meaning-making is more likely to notice it. This variance highlights a critical issue: teachers' conceptualizations of CT directly influence how they promote it (Yuan et al., 2022), yet research on EFL teachers' specific conceptualizations remains sparse (Li, 2023). While Li's (2023) qualitative study provides valuable insights into teachers' CT conceptions, her methodology lacks the structured intervention approach employed in this research. Some view CT as a set of discrete skills, others as a holistic disposition (Ku, 2009). This lack of consensus suggests teacher education must cultivate both CT dispositions and provide concrete, transferable strategies for classroom integration (Abrami et al., 2008; Alinejad et al., 2024).

Teacher Noticing as a Mediating Skill

Teacher noticing, defined as the ability to attend to and interpret significant moments in classroom interactions (Sherin, Jacobs, & Philipp, 2011), is the linchpin for adaptive teaching (Erickson, 2011). It involves a two-stage process: attending to salient student behaviors or ideas, and interpreting their instructional significance (van Es & Sherin, 2002; Sherin & van Es, 2009).

While extensively researched in mathematics and general education, the application of teacher noticing to language instruction, and specifically to the domain of critical thinking, is underexplored (Chan et al., 2021; Yun et al., 2024). This represents a major theoretical and practical gap. Noticing is particularly salient for language teachers, as it underpins the ability to respond to errors, communication strategies, and cultural perspectives (Llinares et al., 2024). Applied to CT, noticing allows educators to identify moments where students analyze, evaluate, or synthesize information within language tasks. Without developed noticing skills, teachers may miss fleeting yet rich opportunities to scaffold higher-order thinking.

Theoretical Frameworks

This study is grounded in four integrated theoretical frameworks that inform both its design and analysis. Constructivism (Vygotsky, 1978; Bruner, 1990) posits that learners (here, teachers) actively construct knowledge through experience. This frames teachers as active interpreters of classroom video, building their understanding of CT from observed evidence. Social Cognitive Theory (Bandura, 1986) emphasizes learning through observation and self-regulation. The video tagging intervention provides models of student CT and opportunities for teachers to reflect on and regulate their own noticing processes. Communities of Practice (Lave & Wenger, 1991) highlights learning within social contexts. The shared task of tagging with a common taxonomy (Jewell, 1996) fosters collaborative sense-making among participating teachers. Finally, the Noticing Framework (Sherin & van Es, 2009) provides the core analytical lens, structuring the investigation into how teachers attend to and interpret CT moments.

Jewell's Reasoning Taxonomy as an Analytical Tool

Jewell's (1996) Reasoning Taxonomy was chosen as the analytical framework for this study. Unlike broader models, it provides a detailed breakdown of reasoning sub-skills, offering a granular tool for noticing nuanced reasoning processes. This is particularly important given that teachers often report limited knowledge of what constitutes critical thinking in practice (Li, 2016, 2023). The taxonomy acts as a cognitive scaffold to guide teachers' attention during the 'attending' phase of noticing.

Method

Research Design

The study adopted an explanatory sequential mixed-methods design. A quasi-experimental component compared an experimental group engaged in video tagging with a control group, measuring changes in noticing quantity and quality. This was followed by qualitative interviews to explain and elaborate on the quantitative findings.

Participants and Setting

Forty-five TEFL postgraduate students from three Iranian state universities volunteered for this study. From this initial pool, thirty participants who met the criterion of having at least five years of EFL teaching experience were purposively selected for inclusion. This selection ensured participants had sufficient practical experience to meaningfully analyze classroom interactions. The final sample consisted of 30 female teachers aged 26-32 (see Table 1 for

complete demographics). The gender homogeneity reflects the accessible teaching cohort in this specific context. All participants had IELTS scores between 5.5 and 6.5 and were enrolled in a postgraduate TEFL program during the 2023-2024 academic year.

Table 1. *Participant Demographic Information (N=30)*

Characteristic	Experimental Group (n=15)	Control Group (n=15)
Gender	All female	All female
Age (Mean, Range)	29.1 (26-32)	28.9 (26-32)
Teaching Experience (Mean years)	6.7	6.5
IELTS Band (Mean)	6.1	6.0
Educational Context	Postgraduate TEFL students, Iranian state universities	Postgraduate TEFL students, Iranian state universities

Instruments and Intervention

The intervention utilized three key components. First, six 5-7 minute video clips of student-centered EFL classrooms were selected from verified online teacher training resources, including the "Shaping the Way We Teach English" series, "Let's Teach English" series, American English Demo lessons, and the Video Enhanced Observation (VEO) platform (https://veo.co.uk). These clips were carefully edited to remove textual cues (captions, subtitles) and non-essential audio, focusing purely on classroom interaction. An expert in EFL education validated the clips as containing observable critical thinking and problem-solving activities. For example, one clip featured a group debate where students had to evaluate the credibility of different news sources about an environmental issue.

Second, Jewell's Reasoning Taxonomy (Jewell, 1996) was employed as the coding framework to define and categorize critical thinking behaviors. This taxonomy was chosen for its detailed breakdown of reasoning sub-skills (e.g., "Considering the Evidence," "Argument Construction"), which provides a more granular tool for teacher noticing than broader models like Paul and Elder's (2013).

Third, ELAN Video Tagging Software, developed by the Max Planck Institute for Psycholinguistics, was utilized. This software was selected for its user-friendly interface and robust video playback capabilities. Unlike alternatives like ANVIL, ELAN integrates alternative libraries for video playback, allowing participants to replay and modify tags easily.

Table 2. *Jewell's Reasoning Taxonomy (Jewell, 1996)*

Section A: Objectives of Reasoning	Section B: Reasoning Strategies	Section C: Reasoning Dispositions
1. To plan	1. The Community of Inquiry	1. Question own position
2. To problem solve	2. Model construction	2. Seek and offer justification for views
3. To decide	3. Argument construction	3. Adopt alternative models
4. To recommend	4. Considering the Evidence	4. Empathize with the beliefs, values and thinking processes of other people
	5. Moral reasoning	

Procedure

The study was conducted in five sequential phases over an eight-week period to ensure systematic implementation and data collection.

Phase 1: Orientation and Training (Week 1)

All participants attended a two-hour orientation session. In this session, the researcher introduced the purpose of the study, provided hands-on training for using the ELAN video tagging software, and thoroughly explained Jewell's Reasoning Taxonomy. Participants practiced tagging a short, non-study video clip to familiarize themselves with the software interface and the application of the taxonomy.

Phase 2: Pre-Test Baseline Assessment (Week 1)

Immediately following the training, all 30 participants completed an initial video tagging task. They were required to independently analyze a standard 5-minute classroom video clip, tag moments they perceived as instances of student critical thinking, and provide a written description for each tag. This task served as the pre-test to establish a baseline for each participant's noticing ability.

Phase 3: Six-Week Intervention (Weeks 2–7)

For the following six weeks, the experimental and control groups followed different protocols.

Experimental Group. Participants in this group completed a weekly video tagging assignment. Each week, they received a new 5–7-minute classroom video clip. Their task was to use ELAN to tag instances of student reasoning and, crucially, to write a descriptive justification for each tag that linked the observed behavior to a specific category or sub-skill in Jewell's Reasoning Taxonomy.

Control Group. Participants in this group participated in weekly seminar-style discussions on general EFL methodology topics, such as task design and classroom interaction. While they watched the same set of video clips used by the experimental group to ground their discussions, they did not engage in any structured tagging or analysis of the videos for critical thinking.

Phase 4: Post-Test Assessment (Week 8)

At the end of the intervention period, all participants completed a final video tagging task under the same conditions as the pre-test, but using a novel video clip. This post-test was designed to measure any changes in their noticing skills.

Phase 5: Qualitative Data Collection (Week 8)

Following the post-test, semi-structured interviews were conducted with a purposively selected subset of 10 participants from the experimental group. The interviews aimed to explore their experiences with the tagging process, any perceived changes in how they viewed classroom interactions, and their understanding of critical thinking in the EFL context.

Data Analysis

The data were analyzed using a convergent mixed-methods approach, where quantitative and qualitative data were collected concurrently, analyzed separately, and then integrated to provide a comprehensive understanding of the research problem.

Quantitative Data Analysis

The quantitative analysis focused on the pre-test and post-test tagging outputs. First, the total number of tags per participant per test was counted to generate a noticing frequency score. Second, the written description for each tag was evaluated using a 5-point rubric. This rubric scored the description based on three criteria: (1) its alignment with the categories of Jewell's Taxonomy, (2) the depth of interpretive analysis provided (from superficial description to analytical inference), and (3) the specificity in describing the student's reasoning process. An average interpretation quality score was calculated for each participant.

To test for significant differences between the groups, we calculated change scores (post-test minus pre-test) for both noticing frequency and interpretation quality. These change scores were then compared using independent samples t-tests. Prior to this, the inter-rater reliability of the qualitative scoring was established by having two researchers independently code a randomly selected 20% of the tags, resulting in a high agreement rate of 92%.

Qualitative Data Analysis

The qualitative data from the interview transcripts were analyzed using thematic analysis following the six-phase framework outlined by Braun and Clarke (2006). The process involved (1) transcribing the interviews verbatim, (2) repeatedly reading the transcripts to achieve familiarization, (3) generating initial codes to capture interesting features of the data, (4) collating codes into potential themes, (5) reviewing and refining themes to ensure they were coherent and supported by the data, and (6) defining and naming the final themes that captured the essence of the participants' experiences.

Integration of Findings

The final stage of analysis involved triangulation. The quantitative and qualitative datasets were integrated by using the rich, explanatory depth of the interview themes (e.g., "developing a vocabulary for CT") to interpret and provide context for the statistical results (e.g., the significant increase in interpretation quality scores). Conversely, the quantitative findings validated and gave measurable weight to the subjective experiences reported by the teachers in the interviews. This integration provided a robust, multi-faceted answer to the research questions.

Results

Quantitative Findings on Noticing Quantity and Quality

Independent samples t-tests revealed significant differences between groups in their improvement from pre- to post-test (see Table 3). The experimental group showed substantially greater gains in both noticing frequency and interpretation quality compared to the control group.

Table 3. *Summary of Pre-test, Post-test, and Change Scores by Group*

Measure	Group	Pre-Test M (SD)	Post-Test M (SD)	Change M (SD)	t (28), p-value	Effect Size (Cohen's d)
Noticing Frequency	Experimental	5.2 (1.1)	12.8 (2.0)	+7.6 (1.5)	18.94, *p* < .001	3.21
	Control	5.4 (1.3)	6.1 (1.4)	+0.7 (0.8)		
Interpretation Quality (1-5 scale)	Experimental	2.1 (0.5)	4.3 (0.4)	+2.2 (0.5)	19.71, *p* < .001	3.33
	Control	2.2 (0.6)	2.5 (0.5)	+0.3 (0.4)		

Note: The experimental group's average number of identified CT instances more than doubled, while their interpretation quality scores improved from basic description (Level 2) to sophisticated analysis (Level 4). In contrast, the control group showed minimal improvement.

Qualitative Shift in Noticing Patterns

Analysis of tag descriptions revealed a fundamental shift in how experimental group teachers conceptualized and described critical thinking moments (see Table 4). Pre-intervention tags were predominantly behavioral descriptions. Post-intervention, tags demonstrated analytical depth, explicitly linking observed behaviors to specific reasoning processes and Jewell's taxonomy categories.

Table 4. *Representative Examples of Tag Description Evolution*

Teacher	Phase	Timestamp	Tag Description	Jewell's Category	Interpretive Depth
T1 (Exp)	Pre-test	0:35	"Student asks clarifying question"	Information Gathering	Basic description
T1 (Exp)	Post-test	1:30	"Student evaluates two solutions by comparing evidence, demonstrating evaluative reasoning"	Evaluation	Analytical
T3 (Ctrl)	Pre-test	0:48	"Student seems confused"	-	Vague observation
T3 (Ctrl)	Post-test	1:00	"Student asks for help"	Information Gathering	Basic description

Note: Exp = Experimental Group; Ctrl = Control Group

Interrelationship Between Noticing Frequency and Quality

Correlation analysis revealed an important developmental pattern. In the experimental group's post-test data, a strong positive correlation emerged between the number of tags (frequency) and the average quality score of those tags ($r = .82$, $p < .001$). This suggests that as teachers became more attuned to noticing CT moments, their interpretations also became more sophisticated. No such relationship was found in the control group's data.

Qualitative Themes from Interviews

Thematic analysis of interview transcripts yielded three overarching themes:

1. **Enhanced Awareness of Critical Thinking:** Participants described how Jewell's taxonomy transformed CT from an abstract concept into identifiable classroom events. One teacher noted, "Before, I knew critical thinking was important, but I didn't have specific things to look for. The taxonomy gave me a vocabulary and a focus."

2. **Shift in Observational Focus:** Teachers reported moving from watching for linguistic errors to "watching for thinking"—for how students' reason through problems and build arguments.
3. **Increased Pedagogical Confidence:** Participants expressed greater confidence in designing activities and providing feedback to promote CT, mentioning plans to incorporate more open-ended tasks and Socratic questioning.

Discussion

The findings demonstrate that explicit noticing practices through video tagging significantly enhanced EFL teachers' ability to identify and interpret CT moments, aligning with and extending key theoretical frameworks. The intervention's success can be attributed to its grounding in social cognitive theory (Bandura, 1986), as teachers refined their noticing skills through observational learning and self-regulated reflection on modeled classroom interactions. By repeatedly analyzing clips, participants internalized Jewell's taxonomy as a cognitive scaffold, which directed their attention to specific CT indicators—a process consistent with the noticing framework (Sherin & van Es, 2009). This addressed the challenge of teachers lacking concrete schemas for recognizing CT (Kurfiss, 1988; Li, 2023).

The increased depth of teachers' interpretations also reflects constructivist principles (Vygotsky, 1978; Bruner, 1990), as participants actively constructed meaning from observed interactions. For instance, teachers began identifying subtle moments of hypothesis testing or perspective-taking in student dialogues, which they previously overlooked. This shift underscores the importance of metacognitive engagement in professional development, echoing findings from general education research (Jacobs et al., 2010). Furthermore, the shared use of Jewell's taxonomy fostered a community of practice (Lave & Wenger, 1991), enabling collaborative refinement of what constitutes 'critical thinking' in EFL contexts. However, the study also reveals that teachers' prior beliefs about language instruction influenced their initial tagging behaviors, highlighting the interplay between cognition and practice (Borg, 2003).

These results extend the noticing framework into the realm of critical thinking, demonstrating that targeted interventions can enhance teachers' ability to recognize and nurture higher-order cognitive skills—a prerequisite for adaptive teaching (Erickson, 2011). The findings align with research emphasizing the role of deliberate practice in teacher expertise (Berliner, 2004), while offering a replicable model for EFL professional development programs.

Conclusion

This study provides definitive answers to the research questions posed, demonstrating the efficacy of a structured video tagging intervention grounded in Jewell's Reasoning Taxonomy for developing EFL teachers' noticing of critical thinking.

In response to Research Question 1, the intervention significantly improved the quantity of critical thinking instances identified by experienced EFL teachers. Quantitative analysis revealed that the experimental group's average number of identified CT instances more than doubled from pre-test (M=5.2) to post-test (M=12.8), showing a substantially greater gain (+7.6) compared to the minimal change in the control group (+0.7). This statistically significant

difference confirms that explicit noticing practice via video tagging enhances teachers' ability to detect more moments of student reasoning in classroom interactions.

In response to Research Question 2, the intervention substantially enhanced the interpretive quality of teachers' observations. The experimental group's interpretation quality scores improved from basic description (Level 2, M=2.1) to sophisticated analysis (Level 4, M=4.3), while the control group showed minimal improvement. More importantly, qualitative analysis revealed a fundamental shift in how teachers described what they noticed: from superficial behavioral descriptions (e.g., "Student asks a question") to detailed analyses explicitly linking observed behaviors to specific reasoning processes from Jewell's taxonomy (e.g., "Student evaluates two solutions by comparing evidence, demonstrating evaluative reasoning"). This demonstrates that video tagging not only helps teachers notice more but also notice more meaningfully, with greater depth and theoretical alignment.

In response to Research Question 3, the intervention transformed the relationship between noticing and interpretation**.** The strong positive correlation found in the experimental group's post-test data (r = .82) between the number of tags (frequency) and their average quality score suggests that these skills develop synergistically. As teachers became more attuned to noticing CT moments, their interpretations became correspondingly more sophisticated. This counter concerns that increased tagging might reflect a superficial "checklist mentality," instead indicating the development of an integrated perceptual-conceptual skill set where quantitative noticing and qualitative interpretation mutually reinforce each other.

Collectively, these findings establish that teacher noticing of critical thinking is not merely an innate ability but a professionally developable skill. The structured video tagging intervention, combining a disciplinary reasoning taxonomy with practical annotation tools, effectively bridged the gap between abstract CT theory and concrete classroom practice. Teachers developed what might be termed "professional vision" for critical thinking—the ability to see, interpret, and respond to student reasoning in action. This enhanced noticing capacity represents a crucial foundation for the adaptive teaching required to foster critical thinkers in EFL classrooms worldwide.

Implications

Based on the conclusive findings of this study, which demonstrate that structured video tagging significantly enhances both the quantity and quality of EFL teachers' noticing of critical thinking, several important implications emerge for theory, practice, and future research.

Theoretical Implications

This study makes a substantial contribution to the theoretical landscape of teacher cognition and professional development. First, it successfully extends the Noticing Framework (Sherin & van Es, 2009) into the specialized domain of critical thinking within language education**.** While the framework has been extensively applied in mathematics and general education, this research provides empirical evidence that its core components—attending and interpreting—are equally vital and developable in the context of EFL. It demonstrates that noticing is not a generic skill but one that requires disciplinary-specific scaffolding, in this case provided by Jewell's Reasoning Taxonomy. Second, the research illuminates the dynamic interplay between

key theoretical perspectives**.** It shows how Social Cognitive Theory (observational learning via video models) and Constructivism (active knowledge construction through tagging) operate in tandem within a Community of Practice (shared task and taxonomy) to foster professional growth. This integrated model offers a more holistic theoretical understanding of how teachers develop complex, situated skills like noticing CT.

Practical Implications

The findings offer a clear, scalable, and practical blueprint for enhancing teacher education and professional development programs.

1. **Curriculum Integration for Teacher Educators:** The core intervention—structured video analysis guided by a discipline-specific taxonomy—should be integrated into both pre-service methodology courses and in-service professional development modules. Teacher educators can adapt this model by selecting focus areas (e.g., noticing student interaction patterns, scaffolding strategies) and corresponding analytical frameworks.
2. **Toolkit for Reflective Practice:** Video tagging with ELAN (or similar accessible software) combined with a reasoning taxonomy provides a powerful toolkit for individual and collaborative reflective practice. Schools and professional learning communities (PLCs) can adopt this approach for peer observation, lesson study, and personal professional growth cycles, moving reflection beyond general impressions to evidence-based analysis of student thinking.
3. **Bridging the Theory-Practice Gap:** The study directly addresses the perennial challenge of translating pedagogical theory into classroom action. By engaging teachers in the active deconstruction of classroom videos, the intervention turns abstract concepts like "evaluative reasoning" or "argument construction" into identifiable, taggable moments. This process provides the concrete schemas and shared vocabulary teachers need to recognize and subsequently foster CT in their own, real-time teaching.
4. **Fostering Adaptive Expertise:** Ultimately, the development of sophisticated noticing skills is a prerequisite for adaptive teaching (Erickson, 2011). Teachers who can accurately interpret student reasoning in the moment are better equipped to make thoughtful instructional adjustments, pose deeper questions, and provide targeted feedback. Therefore, investing in noticing development is an investment in instructional quality and responsiveness.

Limitations and Future Research

Several limitations warrant consideration. The homogeneous sample (all female, Iranian postgraduate students) limits generalizability to other contexts. Future research should include more diverse participants across different educational systems. The six-week intervention period raises questions about long-term retention and transfer to live teaching. Longitudinal studies tracking whether improved noticing translates to changed classroom practices and enhanced student CT outcomes would be valuable. Additionally, while the control group engaged in relevant discussions, a more active control condition (e.g., video viewing without taxonomy guidance) might better isolate the specific effects of the tagging scaffold.

While this study establishes a strong foundation, it also points to several productive avenues for future inquiry.

1. **Longitudinal and Transfer Studies:** A critical next step is to investigate the long-term retention of improved noticing skills and, more importantly, their transfer to live teaching practice. Longitudinal studies that track whether teachers who undergo such training subsequently demonstrate more CT-responsive teaching in their own classrooms and whether this leads to improved student CT outcomes are essential.
2. **Contextual Generalizability:** Research should replicate and extend this intervention with more diverse participant groups (e.g., different cultural contexts, varying experience levels, male teachers, pre-service teachers) to test the robustness and adaptability of the model across different educational ecosystems.
3. **Refining the Intervention:** Comparative studies could explore the effects of different taxonomies, technological tools, or dosing schedules (e.g., length of intervention, frequency of tasks). Investigating the specific contributions of each component (video analysis, taxonomy, software, collaborative discussion) would help optimize the design of future professional development programs.
4. **Exploring Broader Applications:** The methodological approach has potential beyond critical thinking. Future research could apply the video tagging scaffold to develop teacher noticing of other complex constructs, such as learner engagement, metacognitive strategies, or intercultural **communicative competence** in language classrooms.

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