

Reflective analysis of indoor mini-court tennis coaching: Challenges in developing ball landing perception among intermediate recreational players

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Abstract:

Indoor mini-court tennis facilities have expanded rapidly in South Korea in the post-COVID period, providing practical solutions for training under spatial and logistical constraints. While scaled practice environments are widely regarded as beneficial for early skill acquisition, considerably less attention has been paid to how reduced court dimensions shape perceptual learning demands for intermediate recreational players transitioning toward full-court performance. In particular, the development of outcome perception related to ball landing and depth judgment remains underexplored within contemporary tennis coaching literature. This study presents a qualitative reflective autoethnographic analysis of indoor mini-court tennis coaching practice, focusing on perceived challenges in supporting perceptual learning among intermediate players. The analysis draws on systematized reflective notes written immediately following coaching sessions conducted between 2023 and 2025 in reduced-size indoor court environments. These reflections documented recurring coaching situations, instructional decisions, and perceived tensions between technical correction and perceptual feedback. Data were analyzed using a reflexive thematic analysis involving repeated familiarization, iterative coding, theme development, and ongoing refinement to ensure analytic transparency and coherence. Three interrelated themes were identified. First, reduced court dimensions were perceived to constrain outcome perception, with intermediate players showing difficulty calibrating depth-related judgments and anticipating ball landing locations in ways that transfer to full-court play. Second, learning responses to mini-court environments differed by skill level: while simplified settings appeared to support engagement and task success for beginners, intermediate players adapted quickly to spatial constraints yet demonstrated limited progression in perceptual calibration over time. Third, coaches experienced persistent dilemmas in balancing technical instruction and perceptual feedback, as reduced-size environments tended to foreground immediately observable technical adjustments while complicating efforts to scaffold outcome-focused perception. These findings suggest that indoor mini-court environments may offer both practical advantages and pedagogical limitations. For intermediate players, reduced-size courts appear most effective when used selectively and aligned with explicit perceptual learning objectives rather than relied upon as a primary training environment. By foregrounding coaching reflection as a source of pedagogical insight, this study contributes practice-informed perspectives to sport pedagogy and tennis coaching research, while acknowledging the context-bound and non-generalizable nature of reflective analysis.

Key Words: tennis coaching, mini-court, perceptual learning, outcome perception, autoethnography, thematic analysis

Introduction

The COVID-19 pandemic substantially disrupted patterns of sport participation worldwide, including in South Korea. National-level analyses have shown that overall physical activity participation declined during the early stages of the pandemic, followed by gradual recovery as public health restrictions were relaxed (Lee et al., 2022; Park et al., 2023). Within this broader context, individual sports that allowed flexible participation formats and smaller group interactions gained increased attention. Tennis, in particular, experienced notable changes in participation culture, facility usage, and coaching environments during and after the pandemic period (Kim & Kim, 2023; Park, 2021).

One prominent post-pandemic development in South Korea has been the rapid expansion of indoor tennis facilities operating under spatial constraints. Many of these facilities rely on reduced-size or mini-court configurations to maximize space efficiency and accommodate growing demand for indoor training environments (Kim & Kim, 2023). Although such environments initially emerged as adaptive solutions during periods of court closures and social distancing, they have since become a normalized component of tennis coaching practice in urban settings. At the same time, reduced-size courts represent a substantial departure from

the spatial and informational conditions of standard tennis courts, raising important pedagogical questions regarding their influence on skill learning.

Research on scaled sport environments has primarily focused on developmental and youth sport contexts. Empirical studies have demonstrated that modifying equipment and playing areas can promote functional movement variability and facilitate early skill acquisition by aligning task demands with learners' physical and perceptual capabilities (Buszard et al., 2020). Systematic reviews further indicate that reductions in court size and net height can positively influence motor learning outcomes in novice populations, particularly in tennis and other net-based sports (Buszard et al., 2016; Timmerman et al., 2015). These findings have contributed to the widespread adoption of scaled environments in introductory sport programs and junior development pathways.

However, the pedagogical implications of reduced-size practice environments for more experienced learners remain less clearly understood. In contemporary tennis coaching practice, intermediate-level recreational players are often trained in the same mini-court environments originally designed for beginners or younger participants. This raises critical questions regarding whether the learning advantages documented in scaled environments for novice populations extend to players who have already developed foundational technical skills. In particular, it remains unclear how reduced court dimensions shape perceptual learning demands related to ball flight, landing anticipation, and outcome awareness—capacities that are increasingly important as players transition toward full-court performance.

Problem Statement

From a theoretical perspective, effective skill acquisition depends on the alignment between practice conditions and the informational demands of performance environments. Representative Learning Design (RLD) emphasizes that practice tasks should preserve key perceptual–motor couplings present in competition to support functional transfer of learning (Pinder et al., 2011). When task constraints are substantially altered, learners may adapt to informational cues that differ from those encountered in performance contexts, potentially limiting the functional value of practice.

In tennis, research applying RLD principles has demonstrated that practice designs maintaining representative perceptual information can enhance skill transfer to match play (Krause et al., 2019). Conversely, modifications to spatial constraints, such as reductions in court size, can lead to emergent behaviors that diverge from those observed under standard performance conditions (Fitzpatrick et al., 2018). While such adaptations may be beneficial for beginners by reducing task complexity, their implications for intermediate players—who increasingly rely on anticipatory skills and outcome perception—remain uncertain.

Despite the growing prevalence of indoor mini-court environments in tennis coaching, empirical research examining perceptual outcomes within these settings is limited. Existing studies have tended to prioritize movement execution, performance indicators, or technical proficiency, with comparatively less attention given to how modified environments influence players' engagement with perceptual information, such as ball flight characteristics and landing anticipation. This gap is particularly salient for intermediate players, for whom continued development depends not only on technical refinement but also on the calibration of perceptual–motor relationships relevant to full-court play.

Purpose of the Study

The purpose of this study is to reflectively analyze coaching experiences within reduced-size indoor tennis court environments, with a specific focus on perceived challenges related to perceptual learning among intermediate players. Grounded in contemporary sport pedagogy perspectives, the study draws on principles of nonlinear pedagogy and constraint-led approaches, which conceptualize learning as an emergent process shaped by interactions among task, environment, and performer constraints (Correia et al., 2019; Renshaw & Chow, 2019).

Rather than evaluating training effectiveness through experimental comparison or performance measurement, this study adopts a qualitative reflective approach to examine how reduced court dimensions may shape coaching decisions and perceptions of players' engagement with perceptual feedback during practice. Particular attention is given to perceived limitations in supporting awareness of ball landing outcomes and depth-related judgment within mini-court settings.

By situating reflective coaching experiences within established theoretical frameworks, the study aims to contribute practice-informed insights to the sport pedagogy and coaching literature. In doing so, it addresses a gap in current research concerning the pedagogical implications of reduced-size environments for intermediate-level learners, while acknowledging the context-specific and non-generalizable nature of reflective analysis.

Methods

Research Design

This study employed a qualitative reflective autoethnographic research design to examine perceptual learning challenges encountered in indoor mini-court tennis coaching. Autoethnography is a qualitative approach that focuses on the systematic analysis of the researcher's own lived experiences in order to generate analytic insight into professional practice and its sociocultural context (Ellis et al., 2011). Rather than seeking

generalizable findings, this approach emphasizes reflexivity, contextual understanding, and the interpretation of experience as a legitimate source of knowledge.

In sport and coaching research, autoethnographic methods have been used to explore how practitioners interpret constraints, make pedagogical decisions, and adapt their coaching practices within specific environments (Cronin et al., 2018). Consistent with this tradition, the present study treated coaching experience not as anecdotal evidence but as a site for structured reflection and analysis. The focus was placed on identifying recurring patterns in coaching decision-making and perceived perceptual challenges, rather than evaluating performance outcomes.

Context of Coaching Practice

The reflective analysis was situated within indoor tennis facilities characterized by substantially reduced spatial dimensions, approximately equivalent to quarter-size courts. These environments became increasingly prevalent in South Korea during and after the COVID-19 pandemic due to restrictions on outdoor facility use and growing demand for space-efficient training venues (Kim & Kim, 2023; Park, 2021).

From a learning design perspective, such environments represent a meaningful modification of task constraints. Representative Learning Design emphasizes that practice tasks should preserve key informational variables that underpin perception–action coupling in competitive performance contexts (Pinder et al., 2011). In tennis, these variables include ball flight trajectories, depth cues, and temporal information related to anticipation and stroke selection. Research applying representative learning principles has demonstrated that practice environments maintaining these informational characteristics can support skill transfer in tennis (Krause et al., 2019).

Within the present coaching context, however, reduced court dimensions altered the spatial and perceptual information available to players. This setting provided a relevant context for examining how logistical constraints associated with indoor mini-court environments may influence the representativeness of practice for intermediate players.

Data Sources

The primary data source consisted of the author’s personal coaching memories and systematized reflective notes derived from routine coaching practice. Reflective notes were written immediately following coaching sessions conducted between 2023 and 2025 in indoor mini-court settings. These notes documented coaching decisions, perceived player responses to practice tasks, and the author’s reflections on perceptual feedback related to ball landing awareness.

Reflective practice has been identified as a key mechanism through which coaches develop professional knowledge and interpret experiential learning (Gilbert & Trudel, 2001). In this study, reflective materials were treated as analytic data rather than descriptive recollections. This approach aligns with prior research that has used structured reflective documentation to examine informal coach learning processes over time (Stoszkowski & Collins, 2017).

Importantly, the reflections focused on the author’s perceptions, judgments, and coaching strategies, rather than on the systematic analysis of individual players. Players were referenced only in generalized terms to provide contextual grounding for the coaching experience.

The reflections constitute the sole dataset; no direct data (e.g., interviews, recordings, performance metrics, or identifiable records) were collected from players or clients.

Analytical Procedure

Data analysis followed a reflexive thematic analysis process. The analysis began with repeated familiarization with the reflective notes to gain an overall sense of recurring issues and coaching situations (Braun & Clarke, 2006). Initial codes were generated to capture segments of text related to perceptual feedback, outcome perception, and coaching decisions associated with reduced court dimensions.

Codes were then compared across coaching sessions and iteratively grouped into broader themes that represented recurring patterns in coaching experience. These themes were refined through repeated review to ensure internal coherence and conceptual clarity. Throughout the analytic process, attention was paid to transparency and reflexivity, with analytic decisions documented to support trustworthiness (Nowell et al., 2017).

Recent methodological discussions have emphasized the suitability of thematic analysis for applied sport research when the analytic process is explicitly aligned with research aims and contextualized within practice settings (Ayre & McCaffery, 2022). This approach was adopted to ensure that the analysis remained grounded in coaching practice rather than abstract theorization.

Ethical Considerations

This study was based exclusively on the author’s reflective analysis of personal coaching practice and did not involve the collection or analysis of data from human participants. No interviews, recordings, systematic observations, or identifiable personal information related to players were collected. References to players’ actions or responses are included solely to contextualize the author’s coaching reflections and are interpreted through the author’s perspective, rather than treated as empirical participant data. All descriptions of coaching situations were generalized and anonymized to prevent indirect identification of individuals.

Ethical considerations were guided by principles commonly associated with autoethnographic research, including reflexivity, responsibility, and respect for the professional context in which experiences occurred (Ellis et al., 2011). Transparency in analytic procedures was maintained to support the credibility and trustworthiness of the study (Nowell et al., 2017). Accordingly, this work does not constitute human-subjects research and did not require approval from an institutional review board.

Results

The reflective analysis of coaching experiences in reduced-size indoor tennis court environments yielded three interrelated themes. These themes do not represent measured learning outcomes or performance changes; rather, they reflect recurring patterns in the author's coaching perceptions, instructional decisions, and perceived tensions encountered when working with intermediate players under spatially constrained conditions. Accordingly, the themes are framed as reflections on coaching decision-making rather than claims about players' outcomes.

Theme 1: Constraints of Reduced Court Size on Outcome Perception

A dominant theme across reflective notes concerned perceived constraints on players' outcome perception in reduced-size court environments. During indoor mini-court sessions, the coach repeatedly noted situations in which intermediate players executed technically stable strokes yet appeared less attuned to variations in ball landing depth and bounce outcomes. Coaching reflections emphasized that stroke production often became calibrated to the immediate spatial boundaries of the mini-court rather than to perceptual information relevant to full-court play.

In particular, drills designed to emphasize rally depth highlighted this tension. Players frequently adjusted swing mechanics in response to proximal cues, such as the opponent's position or the moment of ball-racket contact, while showing limited sensitivity to distal cues associated with ball flight trajectory and landing location. From the coach's perspective, this pattern suggested a narrowing of perceptual focus under reduced spatial constraints. Prior research has demonstrated that effective outcome anticipation in tennis relies on the integration of multiple sensory cues, including visual and auditory information, to support accurate prediction of ball landing locations (Cañal-Bruland et al., 2018). Within the mini-court context, the coach perceived that such integration was less consistently engaged.

Reflective notes further indicated that contextual and affective factors shaped attentional engagement with outcome-related feedback. When task difficulty was perceived as reduced due to spatial constraints, players occasionally appeared less invested in monitoring ball landing outcomes, instead prioritizing task completion. This observation aligns with research suggesting that perceptual anticipation in tennis is influenced by emotional and contextual states, which can modulate attentional allocation during performance (Shangguan et al., 2022).

The coach's reflections also drew on broader theoretical considerations regarding motion-in-depth perception. Differences between expert and less experienced players in perceiving depth-related information have been documented, highlighting the role of exposure to representative perceptual cues in refining outcome awareness (Wei et al., 2025). Although Wei et al. (2025) examined motion-in-depth perception under controlled experimental conditions, their findings provided a conceptual reference point for interpreting the coach's perception that reduced exposure to depth-related information in mini-court settings may limit opportunities for perceptual calibration among intermediate players.

Theme 2: Differences in Learning Effectiveness Between Beginners and Intermediate Players

A second theme reflected perceived differences in how reduced-size environments supported learning at different stages of development. Coaching reflections consistently contrasted the apparent usefulness of mini-court settings for beginners with the more ambiguous value of such environments for intermediate players. For novice participants, reduced court dimensions appeared to support early engagement and task success by lowering immediate performance demands. In contrast, intermediate players were perceived to adapt rapidly to the constraints but showed limited progression in outcome-related perceptual awareness over time.

This pattern resonated with existing evidence indicating that equipment and space scaling can facilitate skill acquisition during early learning stages by aligning task demands with learners' physical and perceptual capacities (Farrow & Reid, 2010). However, as players advance, learning priorities increasingly involve refining perceptual-motor couplings under more complex and representative conditions. Research on scaled equipment in youth tennis suggests that benefits observed in novice populations may not transfer directly to more advanced learners (Gimenez-Egido et al., 2020).

From a reflective standpoint, the coach perceived that sustained practice in reduced-size environments may contribute to the stabilization of movement solutions that are functional within mini-court contexts but less adaptable to full-court demands. While scaled environments have been shown to promote functional movement variability (Buszard et al., 2020), the coach noted that such variability did not consistently translate into improved perceptual discrimination related to depth and outcome anticipation among intermediate players. This tension emerged repeatedly in reflections when considering training progression and long-term skill development.

Theme 3: Coaching Dilemmas in Balancing Technical Instruction and Perceptual Feedback

The third theme captured an ongoing coaching dilemma related to balancing technical instruction and perceptual feedback in reduced-size practice environments. Reflective notes indicated that technical errors were often more immediately visible and readily correctable within mini-court settings. As a result, coaching interactions frequently gravitated toward technical cues, even when the coach intended to emphasize perceptual awareness and outcome anticipation.

This tendency mirrors prior observations that practice design can shape the relative emphasis placed on technical execution versus perceptual and decision-making components of performance (Anderson et al., 2021). Within reduced-size environments, the constrained spatial context appeared to reinforce this imbalance, as immediate mechanical adjustments were more salient than subtler perceptual misalignments related to ball landing outcomes.

Coaching reflections also revealed uncertainty regarding how to scaffold perceptual learning when representativeness was reduced. Attempts to verbally cue outcome perception often lacked clear reference points within the mini-court context, leading the coach to rely more heavily on corrective feedback rather than exploratory learning tasks. This dilemma was experienced not as a methodological failure, but as a persistent tension between maintaining practice efficiency and supporting perceptual development aligned with full-court performance demands.

Discussion

The purpose of this discussion is to interpret the reflective themes identified in the results by situating them within established frameworks of perceptual–motor learning and coaching practice. Rather than evaluating effectiveness or making causal claims, the discussion focuses on how reduced-size indoor tennis courts may shape perceptual learning opportunities for intermediate players, as understood through representative learning design and constraint-led pedagogical perspectives.

Reduced-Size Courts and Perceptual–Motor Representativeness

The first theme highlighted persistent challenges related to outcome perception within reduced-size court environments. From a representative learning design perspective, these challenges can be interpreted as a consequence of altered informational constraints. Representative learning design emphasizes the preservation of key perceptual information that supports functional perception–action coupling in performance contexts (Pinder et al., 2011). In tennis, such information includes ball flight characteristics, depth cues, and temporal relations that underpin anticipatory judgments.

The reflective observations suggest that reduced court dimensions may attenuate the availability or salience of depth-related information, thereby limiting opportunities for intermediate players to calibrate outcome perception in ways that transfer to full-court play.

Previous research has demonstrated that practice environments preserving representative perceptual information can enhance skill transfer in tennis (Krause et al., 2019). The present reflective findings extend this work by suggesting that when spatial constraints substantially diverge from performance conditions, perceptual learning opportunities—particularly those related to outcome anticipation—may be reduced for players beyond the novice stage.

Importantly, this interpretation does not imply that reduced-size courts are inherently ineffective. Rather, it suggests that their representativeness may be limited for specific learning objectives, especially those requiring sustained engagement with distal perceptual cues relevant to competitive performance.

Skill Level, Constraint Scaling, and Nonlinear Pedagogy

The second theme revealed clear differences in how beginners and intermediate players appeared to respond to reduced-size environments. Constraint-led and nonlinear pedagogical approaches conceptualize learning as an emergent process shaped by interactions among task, environment, and performer constraints (Correia et al., 2019; Renshaw & Chow, 2019). Within this framework, scaling task constraints can create affordances that support exploration and early engagement, particularly for learners with limited prior experience.

Reflective analysis indicated that beginners often benefited from simplified spatial constraints, consistent with prior evidence that scaling equipment and space can support early skill acquisition (Farrow & Reid, 2010; Gimenez-Egido et al., 2020). However, for intermediate players, the same constraints appeared to offer diminishing returns in terms of perceptual calibration. While players adapted efficiently to the mini-court context, opportunities to refine depth-related perception relevant to full-court play seemed limited.

This observation aligns with the notion that the effectiveness of constraints is contingent upon the learner's current capabilities and learning needs. As skill level increases, learning priorities shift toward maintaining adaptable perceptual–motor couplings under representative conditions.

Although scaled environments have been shown to promote functional movement variability (Buszard et al., 2020), the present findings suggest that such variability does not necessarily translate into enhanced outcome perception for intermediate players when representativeness is reduced.

Coaching Practice and Instructional Dilemmas in Reduced Environments

The third theme highlighted a recurring coaching dilemma concerning the balance between technical instruction and perceptual feedback. Reflective notes indicated that reduced-size environments often made technical aspects of performance more immediately observable and correctable, while perceptual misalignments related to outcome anticipation were more difficult to address explicitly.

Previous coaching research has shown that practice design strongly influences the emphasis coaches place on technical, tactical, and perceptual components of learning (Anderson et al., 2021). In reduced-size contexts, the constrained spatial environment appeared to reinforce a technical focus, potentially at the expense of perceptual attunement. This may reflect a broader tension between practice efficiency and the preservation of learning conditions that support long-term transfer.

From a pedagogical standpoint, these observations suggest that environmental constraints alone may be insufficient to scaffold perceptual learning in reduced-size settings. Without deliberate strategies to preserve or supplement representative perceptual information, coaches may default to instructional modes that prioritize immediate technical correction rather than exploratory perceptual engagement.

Implications for Coach Education and Practice Design

Taken together, the reflective findings underscore the importance of aligning practice environments with targeted learning objectives. Reduced-size courts should be understood as context-dependent tools rather than universally beneficial solutions. Representative learning design offers a useful framework for evaluating whether practice tasks preserve the informational constraints necessary for specific learning outcomes (Pinder et al., 2011).

For coach education, these findings highlight the need to develop practitioners' capacity to critically appraise practice environments and to adapt task constraints in response to players' developmental stages. Constraint-led approaches emphasize flexibility and ongoing adjustment rather than fixed practice formats (Correia et al., 2019; Renshaw & Chow, 2019). Applying these principles in indoor mini-court contexts may help coaches balance logistical constraints with pedagogical effectiveness, particularly when working with intermediate players.

Conclusions

This study reflectively examined coaching experiences in indoor mini-court tennis environments, with particular attention to challenges associated with developing ball landing perception among intermediate players. Using a qualitative autoethnographic approach, the analysis focused on how reduced-size practice settings shaped coaching decisions, perceptual feedback, and perceived learning limitations, rather than on evaluating performance outcomes.

Across the reflective analysis, three interconnected themes were identified. First, reduced court dimensions appeared to be associated with constraints on outcome perception, particularly in relation to depth judgment and anticipation of ball landing locations. Second, learning responses to scaled environments differed by skill level, with beginner players often benefiting from simplified constraints, while intermediate players showed more limited progression in perceptual calibration over time. Third, coaches experienced ongoing dilemmas in balancing technical instruction with perceptual feedback, as reduced-size settings tended to foreground immediately observable technical corrections while complicating efforts to support outcome-focused perception aligned with full-court performance demands.

Taken together, these findings suggest that indoor mini-court environments offer both practical advantages and pedagogical limitations. From a coaching perspective, reduced-size courts should not be viewed as universally beneficial or detrimental, but as context-dependent tools whose effectiveness depends on how they are integrated into broader training programs. For intermediate players in particular, sustained reliance on reduced spatial constraints may limit opportunities to engage with depth-related perceptual information that is critical for transfer to standard competitive environments. Selective use of mini-court settings, combined with deliberate practice designs that preserve key informational constraints, may help mitigate these limitations.

From an applied standpoint, the study highlights the importance of reflective practice in coach education. Engaging critically with one's own coaching experiences can support greater awareness of how practice environments shape perceptual-motor demands and instructional priorities. Frameworks such as representative learning design and nonlinear pedagogy provide useful lenses for evaluating whether training tasks align with intended learning objectives, especially when logistical constraints necessitate modified practice environments. Several limitations of this study should be acknowledged. As a reflective autoethnographic inquiry, the findings are grounded in the author's professional coaching experiences and are not intended to be generalized across all tennis contexts. The absence of direct participant data, systematic observation, or performance measures limits the ability to draw causal conclusions about learning outcomes. Nonetheless, the value of this study lies in its capacity to surface practice-informed insights and tensions that may resonate with other coaches working in similar environments.

Future research could extend this line of inquiry by examining perceptual learning processes across different court sizes using complementary qualitative and quantitative approaches. Comparative studies involving intermediate and advanced players, as well as investigations incorporating perceptual or decision-

making measures, may further clarify how practice representativeness influences learning across developmental stages. Such work could contribute to more nuanced, evidence-informed guidelines for the use of reduced-size environments in tennis coaching and coach education.

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The author confirms being the sole contributor of this work and has approved it for publication.

The Use of Generative AI statement

During the preparation of this work, the author used the generative AI-assisted tool(ChatGPT) only in order to check grammar, spelling, and linguistic clarity. After using this tool/service, the author reviewed and edited the content as needed and takes full responsibility for the content of the publication.

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