The Dual Effects of Structured and Relational Interventions in Piano Lessons: An Interdisciplinary Case Study of a Preschool-Aged Child with Autism Spectrum Disorder (ASD)

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Abstract. This practice-based, single-case study followed a six-year-old child with autism spectrum disorder (ASD) over two years of piano instruction in a naturalistic lesson setting, testing a teaching framework that combines structured scaffolding with relationship-based engagement. Data sources included the teacher's post-lesson reflective journals, a repertoire and technique log, and brief parent communications. Sustained attention increased from approximately 10 minutes to 45 minutes per session, and by the end of the study the child could complete 90-minute lessons with one break. On-task behavior rose from about 60% to 85–90%. Repertoire and technique milestones included completion of Czerny's Op. 599 and Op. 849, major and minor scales in keys with up to five sharps and five flats, and selected movements from Mozart and Beethoven piano sonatas. Relational strategies--such as adopting a peer-like tone, offering choices, using exchange-based reinforcement, and leveraging the child's interest in cats-promoted active communication and participation while reducing anticipatory anxiety at lesson onset. The findings suggest that combining structured and relational strategies can concurrently support lesson organization, technical progress, and emotion regulation. Replication with additional students and instructors is needed to assess generalizability.

Keywords: Piano Pedagogy; Autism Spectrum Disorder; Structured Teaching; Relationship-Based Support; Sustained Attention.

1. Introduction

Structured lessons and clear goals are foundational in early piano instruction. For learners with ASD, however, structure alone often does not address emotional dysregulation, transition difficulty, and distractibility [1]. Two imbalances are common in practice: overemphasizing technique and discipline at the expense of relational connection and emotional safety, or lowering expectations out of concern about frustration, which slows skill development [2]. This study followed one six-year-old with ASD in a naturalistic setting, centering music education while drawing on music therapy principles to explore a pathway that integrates structured supports with relational attunement.

This work offers an actionable, low-burden approach for practice: a compact lesson architecture that combines task analysis, reinforcement-and-fading procedures, and relationship-centered communication; guidance for parents on channeling strong interests (e.g., cats) into motivation and self-regulation; and a minimalist documentation approach that enables replication and later aggregation across cases.

Aim: To observe, in a naturalistic instructional setting, the effects of combining structured and relational interventions on lesson organization, sustained attention, and progress in technique and repertoire.

Research Questions: (1) To what extent do a structured lesson routine and systematic task analysis extend sustained attention, reduce the need for breaks, and increase on-task behavior? (2) When implemented together, do structural predictability and relational flexibility facilitate steadier progress in technical learning (e.g., scales, etudes, sonatas)? (3) Do relationship-based and interest-based strategies (peer-like tone, choice, exchange-based reinforcement, integration of preferred interests) increase voluntary participation and spontaneous communication?

2. Related Research

In instrumental teaching, clarity of lesson structure, task decomposition, visible progress logs, and phased goals are widely associated with increased self-efficacy and reduced frustration. For learners with ASD, predictable routines and visual supports, constrained choices, and simple reward systems are commonly recommended, with special attention to transitions and sensory load [3, 4]. Relationship-building matters: a peer-like tone, immediate specific affirmation, and connecting to preferred interests can lower entry barriers and sustain engagement. Integrating education's skill focus with therapy's relational safety yields a structural–relational approach that can advance technical work while maintaining a workable emotional window for learning.

3. Theoretical and Operational Framework

The structural–relational pathway is defined succinctly. Structure: fixed time blocks, a visual plan (e.g., "Three Whiteboard Tasks"), and consistent reinforcement with systematic fading. Relation: peer-like communication, two-choice/exchange procedures, and interest-based links (e.g., "cat" themes) as light-touch, fadeable motivators. In tandem, structure reduces uncertainty and cognitive load, while relation enhances autonomy and positive affect; together they support attention and emotion regulation and, downstream, more reliable technical progress [5].

4. Methodology

4.1 Case Background and Initial Assessment

The child presented with marked anxiety in unfamiliar settings, strong dependence on the mother, and difficulty initiating speech. Engagement improved when low-demand responses (nod/shake) were offered. At baseline, sustained attention dropped after about 10 minutes; 45-minute lessons typically needed multiple short breaks. The child avoided unfamiliar repertoire and people, but showed strong interest in "cats" and familiar anime/TV themes. The teacher prioritized "build trust before teaching," used a peer-like tone, and then gradually transitioned to classical material.

4.2 Design and Setting

This was a single-case, practice-based study over two years. Lessons were delivered by the same teacher in a consistent piano room with a predictable routine and visual supports. Frequency and duration were adjusted over time, with periods of increased dose during competition preparation, but the core procedures remained stable.

4.3 Teaching Process

The lesson process combined a standardized script with differential reinforcement [6]. On entry, lessons began with a brief greeting and review of the previous session, followed by a warm-up using familiar melodies through light singing or tapping. When the child displayed pronounced nervousness or difficulty settling, the greeting/conversation phase was appropriately extended (e.g., discussing recent interests or schoolwork) to ease tension and transition naturally into musical tasks. The student first listened to an audio model, then played familiar passages or imitated short phrases, and ultimately moved to at-the-keyboard practice.

Core work centered on segmented practice using "minimum units of success" [7]. A whiteboard displayed "Three Tasks for This Session," with each completed task followed by a small choice, a short break, or "cat time." Closure involved identifying "the best moment of this session" and scheduling predictable next steps. Before switching pieces or increasing difficulty, advance notice, countdowns, and limited choices were provided. After each lesson, the teacher documented a brief teaching log and updated the repertoire and technique records.

4.4 Ethics and Collaboration

The study adhered to minimal-risk principles and teacher–parent collaboration. Parental consent was obtained, records were anonymized, and the child's periods of nonverbal communication were respected without pressure to speak. Rewards were limited to non-food, non-overstimulating items to prevent dependency. Collaboration centered on visualized goals: daily 20–30-minute independent home practice was broken down into actionable micro-tasks (e.g., playing a difficult phrase correctly 10 times with a metronome, zero errors). Parents provided feedback using cards or a whiteboard, enabling the teacher to make incremental progressions and individualized adjustments.

5. Implementation Details

5.1 Structured Strategy

The protocol emphasized visualization and "correct repetitions within a fixed time window." "Three Tasks for Today" were listed on the whiteboard. The timer was set to record total correct repetitions within a defined window (extended to 8–10 minutes if the target was not met), prioritizing goal attainment to lengthen focus and foster self-monitoring. Task decomposition began with single-hand melodic lines drawn from familiar material, then gradually layered harmonies. Scale work progressed from one octave at a slow tempo to two to three octaves at higher tempi. Rules and reinforcement were applied consistently and transparently: lapses in attention resulted in reduced break time or added repetitions; strong performance resulted in extended breaks or "cat time."

5.2 Relational Strategies

The approach emphasized low threat and high autonomy [8]. The teacher maintained at-eye-level posture, slowed speech, and replaced blame with specific, positive descriptions to strengthen self-efficacy. Perceived control was increased through "choice–exchange" procedures (e.g., choosing between two phrases or two pieces; selecting a tempo between 60 and 66 bpm). Brief "cat" rewards and interest-based metaphors (e.g., "kitten's light steps") were used to connect meaning with positive affect and support internalization of motivation.

5.3 Transition Design

Transitions were designed to reduce switching costs by combining procedural scripts with anchor behaviors. The standard sequence—enter the room → brief familiar tune → two light taps → Three Whiteboard Tasks → practice—was reinstated after any interruption by first returning to the anchor (two taps or a brief familiar tune) and then resuming the task, enabling an attention reset and rapid re-initiation of the behavior chain.

6. Results

6.1 Attention and On-task Engagement

Sustained attention increased from about 10 minutes to 45 minutes, and later the child completed 90-minute lessons with one break. On-task engagement rose from roughly 60% to 88–90%. The cost of getting into the lesson dropped: warm-ups were completed quickly, and routine greetings and brief banter were sufficient to settle.

6.2 Repertoire and Technical Progression

The child completed Czerny Op. 599 and Op. 849, learned major and minor scales in keys with up to five sharps and five flats, and studied excerpts from Mozart and Beethoven sonatas. Technical micro-metrics improved: error density in designated passages declined from about 0.8 to about 0.2

errors per measure, and tempo compliance (within target bpm ± 5) increased from about 40% to about 85%.

6.3 Changes in Communication and Participation

Communication moved from nonverbal responses (nodding/shaking) to short spoken responses and task-adjustment requests, then to initiating choice queries and negotiating brief exchanges in return for playing one notated phrase. The child accepted teacher–student alternating practice ("my turn—your turn"), expressed clear preferences in two-choice tasks, and accepted consequences (e.g., choosing a faster tempo meant one rounder), indicating emerging rule understanding and self-regulation.

6.4 Family Feedback and Generalization

Parents and caregivers reported reduced anxiety and avoidance (less resistance to outings and unfamiliar spaces), a shift from delays/refusals to mostly on-time lesson attendance with anticipation, spontaneous positive recall of lesson moments, and better adherence to short, segmented home practice. These observations suggest generalization beyond lessons and some durability over time.

7. Discussion

Pairing structured supports with relationship-based strategies appears to be a workable mechanism for improving engagement and steady technical growth at relatively low psychological cost. Structure clarifies how to learn (predictable routine, segmented tasks, visible goals, calibrated reinforcement); relation makes why to learn tangible (peer-like tone, two-choice/exchange, interest-based links). Together, they help hold attention, reduce transition friction, and sustain progress on formally structured repertoire.

Practical implications. A simple microcycle—preview, choice, execution, review—can be used at every transition or challenge: preview the task, offer a two-choice option, complete the unit, give an immediate, specific positive review, then move on. Regularity matters: fixed meeting times and consistent lesson routines reduce transition anxiety, and parents can mirror the short, segmented structure at home. For documentation, a minimalist "one sticky note per lesson" focused on a few core metrics (sustained attention, number of breaks, units completed, effective strategies, communication highlights) produces useful trendlines without adding burden.

8. Limitations and Future Research

8.1 Limitations

External validity is limited by the single learner and single teacher. Internal validity is challenged by time-related factors (maturation over two years, changes in school/home contexts, and periods of intensive training) that co-occurred with instruction. Reliance on teacher self-report without independent observation or video introduces potential bias.

8.2 Future Directions

Replication with multiple learners and teachers using a standardized minimal record set (sticky-note log plus repertoire/technique ledger) over several months would test replicability and generalizability. Within-case micro-experiments using alternating treatments (Structured-Only Weeks vs. Structure + Relation Weeks), or a multiple-baseline design across participants, can compare on-task rate and unit completion to strengthen causal inference.

9. Conclusion

This study traced a two-year piano-learning trajectory for a six-year-old with ASD and outlined a structural–relational pathway. With fixed routines, segmented practice, visible goals, and calibrated reinforcement paired with a peer-like tone, two-choice/exchange, and interest-based links (e.g., "cat time"), sustained attention rose from about 10 minutes to 45–90 minutes, breaks decreased, repertoire and technique advanced, and communicative initiative and participation improved. The approach is clear, replicable, and low-burden. While a single case cannot establish generality or causation, the pattern suggests that when structure makes the "how" clear and relation makes the "why" felt, technical growth and emotional steadiness can develop together in lessons. Further work should test this package across multiple learners and teachers and explore which combinations work best for different learner profiles.

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