



Research Paper

Braiding Cognition, Language, and Emotion: An Exploratory Multiple-Case Study of Self-Regulation in Nigerian Preschools

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ABSTRACT: Self-regulation draws on cognitive, linguistic and emotional processes, usually studied separately, so little is known about how they operate together in real time. The gap matters most in multilingual, low-resource classrooms, where children regulate in a language they are still acquiring. This exploratory multiple-case study examined regulatory episodes in three Nigerian preschools with contrasting language ecologies. Data comprised 84 hours of video-recorded classroom observation of 18 focal children (324 child-hours, 5,040 time-sampled intervals), 27 child-hours of home observation, 27 interviews, informal conversations and documents. Analysis used a sensitising heuristic, the braided construct, which asks whether the three elements co-occur within single episodes. Bilingual children moved between home language and English in three functionally distinct ways: self-scaffolding, emotion regulation and social negotiation. Teachers and caregivers held divergent cultural models of emotional expression, which shaped their scaffolding. Episodes lacking co-occurrence accompanied observable difficulty, though a negative case, quiet restraint, indicates co-occurrence is one pathway rather than a requirement. Practitioners in such settings should allow children their full linguistic repertoire. On reflection, the heuristic proved useful for noticing; developed alongside these data, it awaits independent testing.

KEYWORDS: self-regulation; private speech; scaffolding; early childhood education; bilingualism; code-switching; Nigeria; qualitative research.

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I. INTRODUCTION

Self-regulation is the capacity to manage one's thoughts, emotions and behaviour in pursuit of a goal. It predicts school readiness and later achievement [1] and, in cohort data followed to age 32, adult health, financial standing and offending [2]. Research has nonetheless examined its cognitive, linguistic and emotional dimensions largely apart from one another: executive function through laboratory tasks [3], private speech through planning [4], emotional arousal through its modulation [5]. The field therefore accounts well for each component and poorly for their interaction, although in classrooms thoughts, words and feelings condition one another continuously.

The gap is widest where regulation is least studied. Nigeria's Early Child Care Development and Education (ECCDE) programme, set out in national policy [6], serves linguistically diverse communities largely through private provision. Most children speak Yoruba or Igbo at home and enter English-dominant classrooms. Two questions follow that the literature cannot answer: how children distribute regulatory work across their languages, and whether scaffolding strategies documented in monolingual Western settings work in the same way when a child regulates in a language still being acquired. Naturalistic accounts of everyday regulation in sub-Saharan African preschools remain scarce.

This study addresses those questions through observation in three Nigerian preschools, organised by a sensitising heuristic introduced in Section 1.1. It contributes an account of regulatory co-occurrence in an under-

represented setting, a preliminary functional taxonomy of code-switching during self-regulation, and an explicit observational check that other researchers can apply and contest.

1.1. The Braided Construct: A Sensitising Heuristic for Cross-Framework Observation

Each framework informing this study accepts that cognition, language and emotion are interdependent, yet each directs attention elsewhere. Vygotsky's [7] sociocultural theory holds that language mediates regulation; Diamond's [3] model identifies the executive functions that make regulatory behaviour possible; the bioecological model places development in nested environmental systems [8]. Each leaves a blind spot: private speech without the arousal that can block access to it, cognitive behaviour without the social processes supporting it, context without the moment-by-moment interplay inside an episode.

The braided construct is introduced here as a sensitising heuristic, meaning a concept that directs observation rather than explains outcomes [9,10]. It puts one question to each regulatory episode: are cognitive, linguistic and emotional elements present together, and if one is missing, what follows for the child? Table 1 contrasts what single-framework observation captures with what the heuristic adds.

Table 1. What single-framework observation captures vs. what the braided construct directs attention towards.

Framework	What it directs attention towards	What the braided construct additionally captures
Vygotsky: language-mediated regulation	Private speech, scaffolding, ZPD	Episodes where vocabulary is rich but tone is hostile and regulation is not observed
Diamond: executive function	Observable cognitive-regulatory behaviours	Episodes where cognitive capacity appears intact but classroom-language access is limited
Bronfenbrenner: contextual variation	Home-school differences, scaffolding quality	Real-time co-occurrence or absence of the three strands within specific episodes
Braided construct	Simultaneous presence or absence of all three strands	Not applicable; a cross-cutting heuristic, not a competing theory

The heuristic neither guarantees that an observer notices such a pattern nor adjudicates between readings of it; it makes the question explicit and repeatable, and Section 6.1 works this through for a particular child. It was itself developed abductively, by moving between theory and data in search of the best available explanation [11], through the three refinements documented in Section 4.9; readers should therefore treat it as a tool that emerged from these data rather than as a validated framework.

1.2. Research Questions

Three research questions guided the inquiry:

RQ1. Under what conditions do behaviours consistent with cognitive executive processes, linguistic mediation, and emotional regulation co-occur during everyday preschool activities?

RQ2. How does private speech, including code-switching between home and classroom languages, co-occur with children's regulatory behaviours in real-time classroom interactions?

RQ3. What adult scaffolding strategies do teachers and caregivers employ, and how do their cultural models of self-regulation shape these strategies?

The paper is structured as follows. Section II reviews the three research tracks and attempts to integrate them. Section III sets out the theoretical framework. Section IV describes the design, data collection and analysis. Section V reports findings by research question. Section VI discusses them against prior work and states the limitations. Section VII concludes.

II. LITERATURE REVIEW

2.1. Separate Tracks in Self-Regulation Research

Three research tracks address the components of self-regulation with limited traffic between them. They share the premise that regulation is multi-componential and differ in what they measure. The cognitive track establishes that executive functions predict school readiness [12,3,13,14] using laboratory tasks that isolate capacity from social and emotional context; its internal disagreement concerns how those capacities should be specified rather than how they are deployed [15,16].

The linguistic track observes children directly, showing how private speech, a child's audible self-directed talk, scaffolds planning and control [4,17,18]. It treats arousal as background rather than as a condition on verbal access, although arousal is recognised elsewhere as central to regulation [19].

The emotion-regulation track relies largely on adult report to examine arousal modulation and its correlates [20,5], and on observation to show that adults socialise emotional competence through everyday interaction

[21]. The three tracks are complementary, each supplying what the others bracket. Collectively, however, they leave one question unaddressed: what happens within a single episode when one component is available and another is not.

2.2. Integration Efforts and Gaps

Integrative work has begun to cross these boundaries, converging on reciprocity between language and regulation while differing in method. Skibbe et al. [22] followed self-regulation and language achievement from preschool to second grade, and Weiland et al. [23] showed executive function and receptive vocabulary developing together, as did vocabulary and regulation in toddlers [24,25]. Alamos et al. [26], using latent change score modelling with 767 children from low-income households, found the relation bidirectional: early emotion regulation predicted gains in narrative language and early language predicted later regulation. Roben et al. [27] traced comparable relations among language, anger expression and regulatory strategies. These studies agree that the domains are coupled and disagree about direction, a disagreement their shared design cannot settle, since all estimate associations between scores months apart.

A second strand observes adults. Silkenbeumer et al. [28,29] showed that teachers adjust co-regulatory support to their reading of each child's independent skill, and Griffin et al. [30] identified teacher facilitation as the most prominent practice area. The strands complement each other, one establishing that the domains are coupled and the other that adults shape the coupling. Neither shows how the domains behave together within the short episodes in which regulation succeeds or fails, the interval this study observes.

Evidence from low-resource contexts is thinner still. The Chicago School Readiness Project showed that teacher training improved classroom emotional climate in Head Start settings in the United States [31], and Obradović and Willoughby [32] identify measurement, contextual influences and interventions as areas where evidence from low- and middle-income countries remains thin. Comparable naturalistic work in sub-Saharan Africa is rare. In Nigeria, English dominates classroom instruction despite mother-tongue policy [6].

2.3. Bilingualism, Code-Switching, and Self-Regulation

How bilingual children use their languages while regulating has attracted little attention. Most private-speech research has used monolingual English-speaking samples, as in Winsler et al. [18]. Because bilingual children's lexical access differs across their languages [33,34], a child regulating in a language still being acquired may have reduced access to strategies available in the home language. Code-switching, the movement between two languages within or across utterances, is well documented in communication, but whether it serves identifiable regulatory functions has not been examined systematically in naturalistic classrooms. The literature thus establishes that the components of self-regulation are interdependent and that scaffolding is culturally situated, while leaving unexamined how all three strands co-occur in real time in multilingual, low-resource settings.

III. THEORETICAL FRAMEWORK

Three perspectives are assigned distinct analytic roles, with the braided construct cutting across them, as Figure 1 shows.

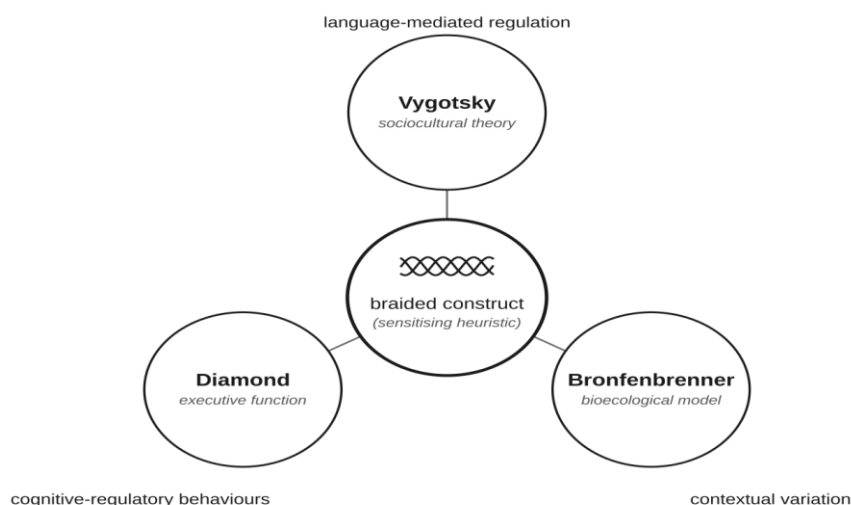


Figure 1. Schematic of the braided construct as a sensitising heuristic.

Note: Outer circles, the three frameworks; central braid, the heuristic directing attention to moments where the strands intertwine.

Vygotsky's [7] theory accounts for development through linguistic mediation, in which private speech is the mechanism by which socially directed speech becomes self-direction [35]. Diamond's [3] model supplies the cognitive strand: inhibitory control, working memory and cognitive flexibility. The bioecological model supplies the contextual strand, capturing how proximal processes such as adult-child interaction interact with person, setting and wider ecology [8]. The braided construct advances no developmental claim of its own; it organises the three into a single observational question about co-occurrence.

IV. MATERIALS AND METHODS

4.1. Exploratory Multiple-Case Design

The study employed an exploratory multiple-case design [36,37] in which three purposively selected preschools were the cases and 18 focal children the embedded units of analysis. The design is qualitatively driven: regulatory behaviour is understood through reflexive thematic analysis of observation, interviews, informal conversations and documents. A subordinate observational strand generated descriptive tallies from time-sampled intervals. These serve as quasi-statistics, making statements such as "most" precise rather than supporting statistical inference, and their use does not in itself constitute a mixed-methods design [38]. Counts are reported with their denominators in Section V and in full in Appendices A and B. Figure 2 summarises the design, the data streams and the analytic pathway.

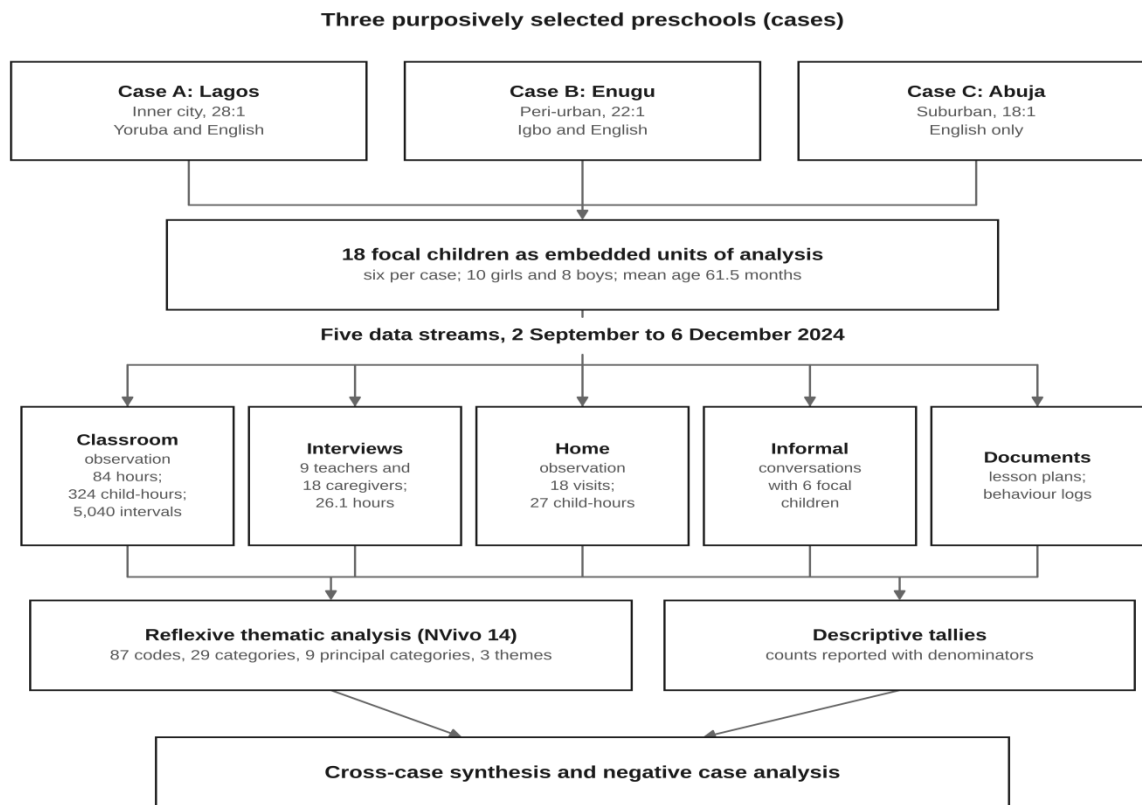


Figure 2. Research design, data streams and analytic pathway.

4.2. Study Context and Cases

Fieldwork was conducted in Lagos (South-West), Enugu (South-East) and Abuja (Federal Capital Territory), where the ECCDE programme faces uneven participation and relies heavily on private provision. Child-teacher ratios were counted on site and ranged from 18:1 to 28:1. The three preschools were selected for purposeful maximum variation in language ecology and socioeconomic context (Table 2).

Case A, inner-city Lagos, was Yoruba and English bilingual at 28:1, serving lower-middle income families; Case B, peri-urban Enugu, Igbo and English bilingual at 22:1, mixed socioeconomic status; Case C, suburban Abuja, English-dominant at 18:1, middle-income. Because these dimensions vary together, differences between cases cannot be attributed to language ecology alone, a constraint revisited in Section 6.4.

Table 2. Case sites and context.

Case	Setting	Home language	Classroom language	Ratio	SES	Focal children
A	Inner-city (Lagos)	Yoruba	Yoruba + English	28:1	Lower-middle	6
B	Peri-urban (Enugu)	Igbo	Igbo + English	22:1	Mixed	6
C	Suburban (Abuja)	English	English	18:1	Middle	6

4.3. Sampling and Participants

Teachers nominated children representing a range of observed regulatory abilities. Nominations were stratified by gender and six children selected at random at each site, giving 18 focal children: 10 girls and 8 boys, comprising four girls and two boys in Case A and three of each in Cases B and C. Mean age was 61.5 months (5;2), range 4;7 to 5;8. Nine teachers, with a mean of 11 years of experience, and 18 caregivers (15 mothers, two fathers and one grandmother) also participated. Child names are pseudonyms; adults are identified by role and number, T1 for a teacher and C5 for a caregiver.

4.4. Researcher Positionality

The first author is a Nigerian early childhood researcher with native fluency in English and Yoruba, working proficiency in Igbo, and prior teaching experience in Nigerian preschools. This insider position eased access; analytic distance was pursued through consistent use of the protocol, team debriefing and reflective memos. The wider team comprised a Chinese educational psychologist providing methodological oversight and a Ghanaian and a Nigerian researcher contributing to validation. The Western origins of the coding framework remained a limitation, monitored throughout and reported in Sections 4.7 and 6.4.

4.5. Data Collection

4.5.1. Classroom Observations

Fieldwork ran from 2 September to 6 December 2024. Observation comprised 42 two-hour blocks, three each week on Mondays, Wednesdays and Fridays, rotating across the three sites, giving 84 hours of classroom observation. Three or four focal children were observed within each block through rotating time-sampled intervals, so each child was observed in nine blocks. This yielded 162 child-observations, 18 child-hours per child and 324 child-hours overall, as Figure 3 sets out. The researcher observed as a non-participant from the classroom periphery after a two-week familiarisation period during which no notes were taken. Early and late field notes were compared and showed no systematic differences in regulatory behaviours or scaffolding patterns; teachers reported having ceased to notice the researcher by Week 4.

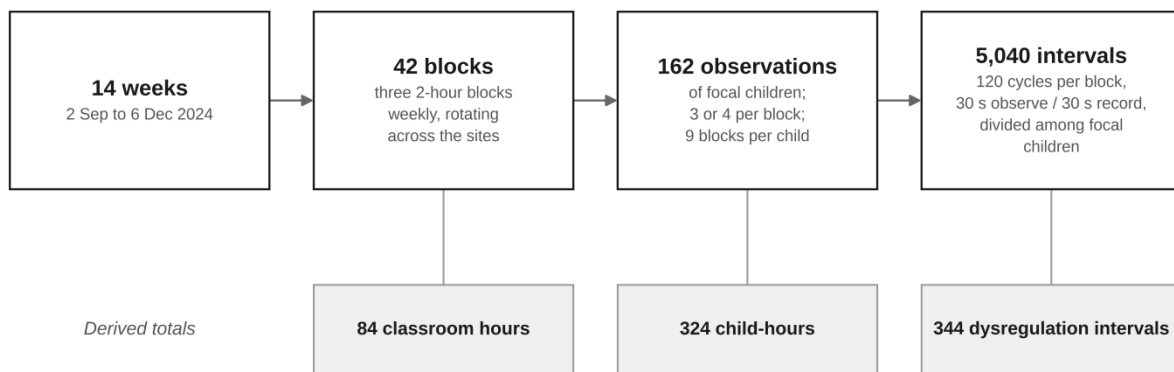


Figure 3. Derivation of the observation totals from the fieldwork schedule.

Observation followed a momentary time-sampling protocol of 30 seconds observing and 30 seconds recording, producing 120 cycles per block and 5,040 intervals. Within each block the cycles were divided equally among the focal children present, so each interval records a single child and the 5,040 intervals are child-level. The protocol recorded behaviours consistent with cognitive processes, such as muttering the steps of a rule; language use, including private speech, emotion labelling and code-switching; and emotional regulation, including self-soothing and recovery. Codes were theory-informed but open to inductive addition; codes such as working-memory rehearsal denote observed patterns consistent with that latent construct, not

direct measures of it. Interval codes were assigned live; the qualitative coding was carried out from the video record.

4.5.2. Interviews

Semi-structured interviews were conducted with all nine teachers and all 18 caregivers, totalling 26.1 hours. Separate 12-question schedules covered participants' understanding of self-regulation, the strategies they had observed children use when frustrated, the role of language in managing behaviour, cultural beliefs about emotional expression, and attitudes towards classroom code-switching. Interviews were conducted in each participant's preferred language, whether English, Yoruba or Igbo, and bilingual assistants transcribed and back-translated the recordings following established guidance [39]. Back-translation identified two emotional idioms with no direct English equivalent, retained in the original language in the Results.

Interviews were analysed as a standalone stream before integration with the observational material, so that participants' perspectives shaped the interpretation of observed patterns rather than illustrating interpretations already settled.

4.5.3. Home Observations, Child Conversations and Documents

Each of the 18 families hosted one 90-minute home observation during routine activities, giving 27 child-hours, of which 16 visits were filmed. Because this is a small fraction of the classroom material, home findings contextualise classroom observation rather than support home-school comparison, and are flagged as tentative. Brief informal conversations with focal children were recorded verbatim in field notes when a child volunteered a comment about managing a task or feeling, or when the observer asked a short open question after an episode; comments from six children are reported as their own accounts of their strategies, not as verification of observed behaviour. Lesson plans and classroom behaviour logs were collected at each site and appear in the Results only where they corroborate a pattern identified in observation or interview.

4.5.4. Video Recording and Transcription

All classroom observation was video-recorded. A stationary camera at the periphery of each classroom, oriented towards the focal activity area, followed the same block schedule as live observation: 14 blocks per case, giving 84 hours of footage. Home observations were filmed in 16 of the 18 families, yielding 24 of the 27 home-observation hours. Video analysis of this kind is established in research on young children's regulation in group settings [40]. The recordings served to verify the wording of excerpts, capture non-verbal behaviour difficult to record in notes, and allow episodes to be viewed repeatedly. Transcripts carry a V prefix with a timecode range, as in V-112 (0:42:16 to 0:42:24); where an excerpt appears in both a field note and a transcript, both identifiers are given and the transcript governs the wording. Tone marks absent from the handwritten notes were restored from the recordings.

Excerpts from observation are verbatim transcriptions from the video transcripts, and from field notes for the two unfilmed home visits; translated excerpts retain the original wording. Excerpts illustrate themes identified in coding rather than confirming theoretical expectations. Sources are identified as FN for field notes, V for video transcripts, INT-T and INT-C for teacher and caregiver interviews, DOC-LP for lesson plans and DOC-BL for behaviour logs.

4.6. Data Analysis

Analysis followed Braun and Clarke's [41] reflexive thematic analysis in NVivo 14. Familiarisation involved repeated reading with reflective memos. Coding combined deductive codes from the three frameworks with inductive codes from the data; a second researcher independently coded a 20% sample, discrepancies were discussed to consensus and the codebook refined. Theming grouped 87 codes into 29 categories under nine principal categories and three themes: co-occurrence of strands; code-switching as a regulatory resource; and adult scaffolding and cultural models. Cross-case comparison then used matrices to identify patterns holding across or distinguishing the cases. Figure 4 sets out the hierarchy and Appendix D the full structure.

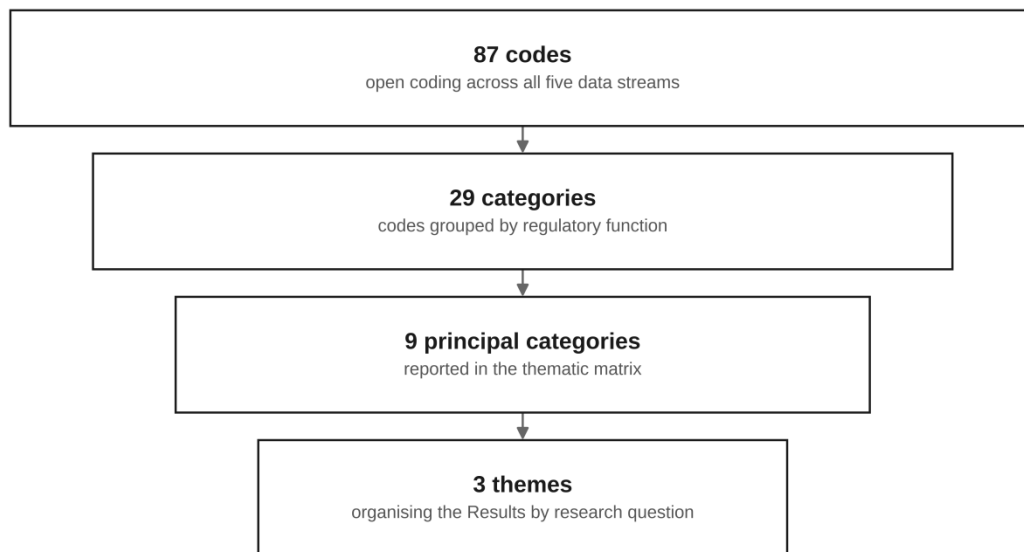


Figure 4. Coding hierarchy and the three themes.

Inter-coder reliability was assessed at three stages, reported as observed agreement and a chance-corrected coefficient, and coded throughout from the video record so that the two coders worked independently of each other and of the live observation. At initial coding, two coders independently coded 100 units across four code families: agreement 78%, Cohen's κ 0.70. At thematic grouping, they assigned 60 categories to themes: 85%, κ 0.77. At interval level, a second coder applied the time-sampling protocol to 504 of the 5,040 intervals, 168 per case, coding each strand and the compound judgement of whether all three were present: raw agreement 87.3% to 92.5%, κ 0.64 to 0.72, and prevalence-adjusted bias-adjusted kappa (PABAK) 0.75 to 0.85. Discrepancies were resolved by consensus without third-reviewer adjudication. Matrices appear in Appendix C, where the two samples are shown to be independent.

Cohen's κ is sensitive to prevalence: full co-occurrence arose in only 11.9% of sampled intervals, which attenuates κ for the compound judgement relative to its raw agreement of 92.5%, the highest of the four. PABAK, which adjusts for prevalence, is highest for that judgement at 0.85. Appendix C sets out the calculation.

4.7. Cultural Validity

A coding framework derived from Western developmental psychology may fail to register culturally specific strategies, so the team examined the dataset for alternative regulatory forms. Two recurred. Quiet sitting with folded hands, first coded as suppression, was reinterpreted as culturally appropriate restraint after teacher member-checking: "When they are quiet like that, they are thinking. It is how we teach them" (INT-T2, line 45). Proximity-seeking near adults, first coded as dependency, was reinterpreted as culturally normative co-regulation, supported by a caregiver's account that "they know the teacher will notice them without making noise. It is respectful" (INT-C7, line 12). Neither was among the most frequent codes, but both occurred often enough for separate analysis; the first is reported in Section 5.5.

4.8. Ethics and Trustworthiness

Caregivers and teachers gave written and verbal consent, and children gave verbal assent renewed weekly, covering the informal conversations. Caregiver and teacher consent and child assent were obtained for video recording; two families declined filming at home and were observed with written notes. No participant withdrew. Digital files were password-protected, paper forms held in locked storage, and data are retained for two years under institutional policy.

Trustworthiness was pursued along the four dimensions set out by Lincoln and Guba [42]. Credibility rested on triangulation across five data streams, prolonged engagement over 14 weeks, peer debriefing within the research team, negative case analysis (Section 5.5), and member-checking in which two lead teachers, T2 in Case A and T5 in Case B, reviewed the theme summaries in Week 15, confirmed that these corresponded to what they observed daily, and proposed refinements including the reinterpretation of quiet restraint. Member-checking was not conducted with caregivers, which is a limitation given the prominence of caregivers' cultural models in the findings. Transferability is supported by thick description of the three settings, and dependability and confirmability by the audit trail reported in Section 4.9.

4.9. Development of the Braided Construct: Audit Trail

The braided construct was refined in three phases, each documented in the audit trail. Before fieldwork, it proposed only that cognition, language and emotion be observed together, asking which strands were present. In Weeks 5 to 8, observation of the bilingual newcomer in Case B (Section 5.4) showed strong cognitive capacity not co-occurring with successful social regulation when English vocabulary was limited; the construct was revised to ask whether each strand was functioning for the others rather than merely present. In Weeks 11 to 14, a home observation in Case C, where rich vocabulary delivered without emotional support accompanied dysregulation, was consistent with that refinement and added emotional tone to the linguistic strand.

V. RESULTS

The Results are organised by research question, each corresponding to one theme, with counts reported against their denominators; full tallies appear in Appendices A and B.

5.1. Co-Occurrence of Cognitive, Linguistic, and Emotional Elements (RQ1)

To answer RQ1, observational data were examined for episodes in which behaviour consistent with executive processes appeared alongside linguistic and emotional regulatory behaviour. The recurring configuration was private speech, sustained attention and emotional recovery within the same interval, recorded in 723 of the 5,040 intervals (Case A 244, Case B 278, Case C 201). One episode illustrates it. In Case B, week 3, Lola (5;3) counted puzzle edges under her breath, checked the picture guide, selected a piece after an 18-second pause, and when classmates tugged at nearby pieces said, “Wait, I’m finishing this side first” (FN-47). Three things occur together: counting aloud, consistent with working-memory rehearsal; resisting the distraction, consistent with inhibitory control; and verbal restatement of her aim, which is private speech.

Comparable patterns appeared across cases. Teacher T1 described one child in the same terms: “When Tunde remembers the rules he laid out for himself, you don’t need to remind him; he just holds back that first impulse” (INT-T1, line 88). Lesson plans treated such skills as teachable objectives (DOC-LP-15), and language and emotion co-occurred explicitly in some episodes: Tunde (5;7) said, “I am angry but I will not hit” (FN-41, week 3), pairing an emotion label with a stated inhibition of the kind Roben et al. [27] traced longitudinally.

Children who verbalised rules during transitions were frequently observed to reorganise workstations without adult involvement, whereas transitions without verbalisation more often drew adult intervention. Because both were coded within the same intervals, no temporal ordering can be established, so this is reported as a prompt for closer examination rather than a finding about transitions.

5.2. Private Speech, Code-Switching, and Regulation (RQ2)

To answer RQ2, cross-case comparison examined language use during self-regulatory episodes. Bilingual children in Cases A and B moved frequently between home language and English; children in the English-dominant Case C did not. Three functional types emerged.

Self-scaffolding used the home language for planning while the child worked in English. Kemi counted in Yoruba while sorting English-labelled cards (FN-112 and V-112, Case A, week 6), and switches were sometimes intra-sentential: “Mo fẹ ló sí ídí, but I need the red one” [I want to get to the end of this sorting task, but I need the red one]. Tunde described the division himself: “English numbers are hard. Yoruba is inside my head” (informal conversation, week 8).

Emotion regulation used the home language for labelling or self-soothing. Ngozi told herself “Nwee udo” [be peaceful] after a peer dispute and re-engaged (FN-127, Case B, week 10); asked how she calmed down, she said, “I tell my heart to nwee udo. Then I can talk.” Her caregiver reported the same sequence at home (INT-C9).

Social negotiation used the home language to manage peer interaction. Chidi said “Ndo [sorry], you can have the blue one” during a dispute over blocks (FN-89, Case B, week 7). Teacher T5 read this as register: “When they argue, sometimes Igbo comes out first. It is their emotional language” (INT-T5).

Across Cases A and B, self-scaffolding was most frequent (170 episodes), then emotion regulation (104) and social negotiation (66); Table 3 summarises the distribution.

Table 3. Code-switching during self-regulatory episodes across cases.

Case	Code-switching observed	Types identified	Illustrative example
A (Yoruba-English)	140 of 412 self-talk episodes (34%)	Self-scaffolding; emotion-regulation	Kemi counts in Yoruba while sorting English cards
B (Igbo-English)	200 of 487 self-talk episodes (41%)	Self-scaffolding; emotion-regulation; social-negotiation	Ngozi uses Igbo self-soothing; Chidi apologises in Igbo

Case	Code-switching observed	Types identified	Illustrative example
C (English only)	0 of 298 self-talk episodes (0%)	Not applicable	Not applicable

Note. Counts are descriptive tallies from momentary time-sampled observations; denominators are self-talk episodes per case.

All six focal children in Case C had English as their home language (Table 2), so switching into a home language other than the classroom language was not available to them. The study did not assess individual children's relative proficiency in Yoruba/Igbo versus English; the inference that home language equals “stronger language” for regulatory purposes is based on observed patterns and caregiver/teacher reports, not on independent proficiency measures.

5.3. Adult Scaffolding and Cultural Models of Self-Regulation (RQ3)

To answer RQ3, interviews and observation were examined for scaffolding strategies and the cultural models informing them. Teachers described regulation as a skill acquired through guided practice. Teacher T4 gave a characteristic account: “Instead of ‘stop that,’ I ask, ‘What's your plan if it topples again?’ They pause, think, and fix it themselves” (INT-T4, line 64).

Caregivers framed regulation relationally and culturally. C11 described modelling rather than instruction: “When I get frustrated, I breathe out loud, so he copies me instead of yelling back” (INT-C11). C3 invoked a norm: “A child who can sit quietly when upset is a child who has learned respect. We don't need them to talk about every feeling” (INT-C3). This sits uneasily with the emphasis on verbal emotion labelling in the Western literature.

Thematic analysis of the caregiver interviews identified three cultural models of appropriate emotional expression. Six caregivers held a restraint model, valuing quiet composure and deference to adults. Eight held an expression-with-guidance model, valuing verbal labelling when accompanied by adult teaching. Four held a contextual model, in which norms vary by setting.

Teachers' views were more uniform and aligned with the second model: all nine held that children should name emotions, though several noted the difficulty when English vocabulary was lacking. T3 identified the constraint: “Some of them know the feeling in Yoruba but not the English word. I wish I could teach in both languages, but the curriculum is English” (INT-T3).

Three scaffolding strategies were observed: predictable rhythms, reflective questioning and calm emotional modelling. The weather-board routine in Case A combined all three, with the class transitioning independently in 8 of 10 observed transitions (FN-102).

Intervals with all three strategies present were more often accompanied by independent regulation than intervals with one, though the coding does not separate the strategies temporally from the regulation that followed.

5.4. Breakdowns in Co-Occurrence: Confirmatory Patterns

Intervals in which regulation broke down were examined systematically. These patterns are confirmatory: they document what was observed when the strands did not co-occur, and a disconfirming case follows in Section 5.5. Of the 5,040 intervals, 344 were coded as dysregulation intervals (Case A 112, Case B 134, Case C 98). Three patterns recurred.

First and most common, no adult scaffolding was present: 233 of 344 intervals (68%), typically during free play or transitions when teacher attention was distributed across many children. Kemi (5;2) became frustrated when she could not find a puzzle piece and cried for approximately 90 seconds with no teacher in proximity (FN-56, Case A, week 4).

Second, one strand was present without the others: 68 intervals (20%). In one episode a routine was announced without reflective questioning or calm modelling, so the child knew what was coming but had neither emotional nor linguistic support for the change (FN-72, Case B, week 5).

Third and least frequent, multiple scaffolds were present and dysregulation still occurred: 43 intervals (12.5%), typically after intense peer conflict or when a child was tired. Chidi (5;5) received both reflective questioning and calm modelling but became overwhelmed after a prolonged dispute and had to be separated from the activity (FN-98, Case B, week 8). Scaffolding is therefore not sufficient in itself.

Two focal cases show the same logic individually. The bilingual newcomer in Case B (4;8), recently arrived from an Igbo-speaking home with limited expressive English, showed behaviour consistent with strong working memory but not social regulation in English-language peer interaction; restricted vocabulary co-occurred with difficulty producing emotion labels and with peer rejection, and conflict incidents fell over four weeks after teachers paired him with a bilingual peer. The cognitive strand appeared intact while the linguistic strand was insufficient for the regulation the classroom required.

5.5. Negative Case Analysis: Quiet Restraint as an Alternative Regulatory Pathway

The patterns above show what happened when the strands did not co-occur, but do not test the heuristic against a case it would misread. One emerged from the quiet restraint pattern (Section 4.7). In Case A, week 5, Sade (5;0) sat quietly with folded hands after a peer took her toy, producing no verbal emotion labelling; the episode was first coded as suppression and grouped with dysregulation (FN-33). Teacher member-checking prompted a different reading (INT-T2, line 45).

Quiet restraint was observed in 47 intervals in Cases A and B and 12 in Case C. Following it, children re-engaged independently within two minutes in 39 of 47 intervals (83%), against 41 of 62 (66%) following verbal emotion labelling. These are descriptive tallies on small subsamples and no inferential comparison was conducted.

The case bears on the heuristic, not only on the coding framework. Quiet restraint involves emotional and cognitive regulation without the linguistic strand the construct prompts the observer to seek, and applying the construct without cultural reflexivity classified it as a breakdown. It therefore bounds the construct's normative assumption: co-occurrence of all three strands may describe one regulatory pathway rather than a requirement.

VI. DISCUSSION

6.1. What the Braided Construct Enabled the Researchers to Notice

The question for the heuristic is whether it adds analytical value beyond the three frameworks. The evidence suggests it does, in a specific and limited way: it directed attention to breakdowns in co-occurrence, episodes in which one strand was present in form but could not function for the others, which single-framework observation would likely attribute to other causes. The bilingual newcomer is the clearest instance. A Vygotskian observer might have recorded limited private speech, a Diamond-informed observer intact working memory, a bioecological observer a home-school language mismatch. The heuristic prompted the check that connected them: cognitive capacity present, linguistic access insufficient for the social regulation the classroom required. What distinguishes the construct is that this check is explicit and operational, which also makes its normative assumption visible [43]: it can surface patterns single-framework observation misses, but can equally misidentify culturally alternative strategies as breakdowns, as quiet restraint did until member-checking corrected it. The construct therefore requires active cultural reflexivity rather than being dispensable, and whether a given episode is a breakdown or an alternative pathway depends on the observer's commitments.

6.2. Code-Switching as a Regulatory Resource

That bilingual children code-switched in three functionally distinct ways bears on classroom language policy. Children drew on home-language vocabulary for particular regulatory purposes while working in an English-medium classroom, and the informal conversations suggest they were aware of these choices.

This extends the language and regulation literature in a specific direction. Alamos et al. [26] established reciprocal development between regulation and expressive language in a low-income sample, but treated language as a single capacity measured at two points. The present episodes suggest that for bilingual children the relevant unit may be which language is available for which regulatory function at a given moment, which is consistent with their reciprocity claim while indicating that measurement in one language may understate a bilingual child's resources.

The pattern generates a testable hypothesis: English-only policies may limit access to children's most developed regulatory linguistic tools. Testing it requires proficiency measures this study did not administer, so the inference that the home language is stronger for regulatory purposes rests on observed patterns and adult report.

The taxonomy rests on a limited number of episodes and is preliminary; systematic linguistic analysis would strengthen it by distinguishing intra-sentential from inter-sentential switches and assessing the reliability of type assignment.

The taxonomy describes these practices as code-switching, following the private-speech literature from which the protocol derived. Translanguaging scholarship would treat the two languages as one repertoire from which features are selected rather than as systems between which children switch [44,45], and the intra-sentential switches observed here sit more comfortably in that framing. Nothing in these data adjudicates between the accounts, but the choice matters: if children draw on one repertoire, an English-only rule restricts part of their own regulatory resources.

6.3. Adult Scaffolding: Cultural Models and Practice

Teachers and caregivers held divergent cultural models, with practical consequences: where caregivers who value restraint send children to classrooms that value verbal expression, children receive inconsistent messages about what counts as regulating well.

Comparison with intervention work in low-resource settings is instructive. Raver et al. [31] improved classroom emotional climate in Head Start through teacher training, and Griffin et al. [30] found teacher facilitation the most prominent practice area. Both treat the teacher as the lever of change. The present findings suggest that where families and classrooms hold different regulatory norms, teacher-focused training may be necessary but insufficient, since the strategies taught can conflict with what children are taught at home. That is one practical contribution of observing where the two diverge.

These models also point beyond the study's Western-derived framework. Indigenous African accounts locate competence in social responsibility and communal participation rather than individual verbal expression [46]. Peer co-regulation was observed in 28 episodes across Cases A and B, including children reminding one another to *nwee udo* when a classmate was distressed (FN-77, Case B, week 6), and on one occasion twelve children sat quietly as the teacher entered (FN-88, Case A, week 8), a display for which the framework had no code. Caregiver accounts described regulation as dyadic rather than individual (C14, Case C), which aligns with relational developmental systems perspectives on parenting [47]. A framework built on these premises might treat the quiet restraint of Section 5.5 as an achievement rather than an absent strand.

6.4. Limitations

Six limitations bound these claims. First, the study is small and exploratory: 18 children in three preschools cannot support generalisation, and 14 weeks cannot capture developmental trajectories. Inferences about latent cognitive processes rest on observed behaviour rather than direct assessment.

Second, the counts are descriptive and must be read as such. With 18 children and no comparison condition, the proportions in Section V indicate how often patterns recurred in this sample; they are not estimates of effect size and support no claim about magnitude. The re-engagement comparison in Section 5.5, 83% against 66%, is a tally on small subsamples rather than a tested difference. Interval-level coding was nonetheless reproducible (Appendix C.3), with agreement lowest in Case B, where code-switching density placed the greatest load on the linguistic strand.

Third, implementation was constrained in ways that shaped the findings. Child-teacher ratios of up to 28:1 meant adult attention was thinly spread, which plausibly contributes to the finding that 68% of dysregulation intervals had no scaffolding present; that proportion reflects staffing as much as teacher practice. The English-medium curriculum constrained what teachers could do with children's home languages, as T3's account indicates. Two families declined filming, leaving the home data uneven, and the presence of an observer and a camera cannot be excluded as an influence.

Fourth, the data streams are unevenly weighted, at 27 home child-hours against 324 in classrooms. Fifth, the cases vary simultaneously in language ecology, socioeconomic context, urbanicity and ratio, so differences between them cannot be attributed to any single dimension. Sixth, the coding framework originated in Western developmental psychology; two culturally specific strategies were identified and one is reported as a negative case, but the prominence of private speech and verbal labelling may still reflect the framework's assumptions. No measure of relative bilingual proficiency was administered, and the construct co-developed with these data, so the findings cannot independently validate it.

6.5. Directions for Future Research

Five questions follow. Whether children permitted to code-switch show different regulatory patterns from those restricted to one language invites experimental comparison. Whether the three functional types survive systematic linguistic analysis requires larger bilingual samples. How cultural models shape scaffolding, and how far they vary across settings, remains open, as does whether a framework built from Nigerian rather than Western premises would identify different dominant strategies. Finally, the heuristic could be tested by asking independent researchers to analyse the same corpus with and without it. Answering the first two would require longitudinal designs; cohort studies such as the New Zealand Best Start study [48] offer one model.

VII. CONCLUSIONS

This exploratory multiple-case study documented co-occurrence among cognitive, linguistic and emotional behaviours during self-regulatory episodes in three Nigerian preschools. Used as a sensitising heuristic, the braided construct directed attention both to episodes in which the strands functioned together and to episodes in which one was present without functioning for the others. Bilingual children moved between home language and English in three functionally distinct ways, and teachers and caregivers held divergent cultural models that shaped their scaffolding. The study establishes no causal relationships and does not confirm the construct as a framework; it offers an account of regulatory processes in a setting the literature has largely passed over, a preliminary taxonomy of code-switching functions, and testable hypotheses.

For educators in multilingual African classrooms, allowing children their full linguistic repertoire may support regulatory processes that restrictive policies constrain, and aligning classroom expectations with families' regulatory values deserves attention in teacher education.

The braided construct should be treated as provisional. Its value lies not in explaining more than existing frameworks but in making one observational check explicit and repeatable, while Section 5.5 shows that the check can misread culturally specific regulation. Whether it yields comparable observations elsewhere is a question this study can pose but not answer.

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