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Formative Assessment Practices and Their Influence on Self-Regulated Learning and Academic Motivation among Upper Primary School Students in India

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Abstract

Formative assessment is widely regarded as a cornerstone of effective pedagogy, yet its relationship with self-regulated learning (SRL) and academic motivation among upper primary school students in the Indian context remains insufficiently examined. This mixed-methods study employed a concurrent triangulation design to investigate how teachers' formative assessment practices influence students' SRL strategies and academic motivation in Grades 6–8 across six government schools in Kerala, India. The quantitative strand involved 280 students who completed the Motivated Strategies for Learning Questionnaire (MSLQ) and the Academic Motivation Scale (AMS-C 28) at the beginning and end of one academic semester (16 weeks). The qualitative strand comprised semi-structured interviews with 18 students and 12 teachers, supplemented by classroom observations ($n = 36$ sessions). Quantitative findings revealed significant improvements in intrinsic motivation ($t(279) = 9.74, p < .001, d = 0.83$) and SRL strategy use ($F(1, 278) = 67.42, p < .001, \eta^2 p = .20$) following structured formative assessment implementation. Qualitative themes identified feedback quality, goal transparency, and peer assessment as key mechanisms linking formative assessment to SRL. Integrated findings suggest that structured formative practices, when implemented with fidelity and teacher training, create a learning climate conducive to autonomous, self-directed learning. Implications for teacher preparation programmes and curriculum reform in Indian primary education are discussed.

Keywords:- Formative Assessment, Self-Regulated Learning, Academic Motivation, Mixed Methods, Upper Primary Education, India, Classroom Assessment

I. INTRODUCTION

Assessment in education has long occupied a central role in shaping the quality of teaching and learning. However, a critical distinction exists between assessment practices that serve primarily summative, certification purposes and those designed to support and improve the ongoing learning process (Black & Wiliam, 1998). Formative assessment—defined as the process of seeking and interpreting evidence for use by learners and their teachers to decide where the learners are in their learning, where they need to go, and how best to get there (Wiliam & Thompson, 2008)—has attracted sustained scholarly and policy attention as a lever for improving learning outcomes, particularly in the foundational years of schooling.

The National Education Policy 2020 (NEP 2020) explicitly emphasizes a shift from rote-learning and summative examination culture toward competency-based, continuous assessment in Indian schools (Ministry of Education, 2020). Despite this policy direction, empirical evidence on the actual implementation and outcomes of formative assessment practices in Indian upper primary classrooms—covering Grades 6 to 8—remains limited (Kumar & Sharma, 2021). International research has demonstrated robust associations between quality formative feedback and self-regulated learning (SRL) skills (Nicol & Macfarlane-Dick, 2006; Zimmerman, 2002), yet it is unclear whether these associations hold in the sociocultural and institutional context of Indian government schools.

1.1 Statement of the Problem

Upper primary school years (Grades 6–8) represent a critical transitional period during which students develop autonomous learning habits, intrinsic motivation, and metacognitive strategies that underpin long-term academic success (Eccles et al., 1993). Indian government schools serving these grades commonly operate under large class sizes, examination-driven pedagogy, and limited teacher training in assessment literacy (NCERT, 2022). These structural features may constrain the effective implementation of formative assessment and, consequently, students' development of SRL competencies and academic motivation. A systematic, mixed-methods examination of this relationship is therefore both theoretically warranted and practically urgent.

1.2 Purpose of the Study

This study aimed to:

- examine the effect of structured formative assessment practices on upper primary students' SRL strategy use and academic motivation over one academic semester, and
- explore the mechanisms through which formative assessment influences students' learning behaviours and motivational orientations as perceived by both students and teachers.

1.3 Research Questions

The study was guided by the following research questions:

- RQ1: What is the effect of structured formative assessment practices on self-regulated learning strategy use among upper primary school students?
- RQ2: What is the effect of structured formative assessment practices on academic motivation (intrinsic, extrinsic, and amotivation) among upper primary school students?
- RQ3: How do students and teachers perceive the mechanisms through which formative assessment practices influence SRL and motivation?

1.4 Hypotheses

The following null hypotheses were tested for the quantitative strand ($\alpha = .05$):

- H₀₁: Structured formative assessment practices will produce no significant change in students' SRL strategy use scores from pre-test to post-test.
- H₀₂: Structured formative assessment practices will produce no significant change in students' intrinsic academic motivation scores from pretest to posttest.
- H₀₃: There is no significant relationship between perceived formative assessment quality and SRL strategy use at posttest.

1.5 Significance of the Study

This study makes several important contributions. Methodologically, the adoption of a mixed-methods concurrent triangulation design addresses the limitations of exclusively quantitative approaches that dominate the assessment literature, enabling richer interpretation of statistical findings through teacher and student voices (Creswell & Creswell, 2018). Theoretically, the study extends Zimmerman's (2002) cyclical model of SRL to the under-researched context of Indian primary education. Practically, findings will directly inform pre-service and in-service teacher education programmes developed under the National Curriculum Framework for Teacher Education (NCFTE, 2023).

2. REVIEW OF RELATED LITERATURE

2.1 Theoretical Framework

This study is grounded in two complementary theoretical frameworks. The first is Zimmerman's (2002) cyclical model of self-regulated learning, which describes SRL as a three-phase cycle: forethought (goal setting, strategic planning, and motivational beliefs), performance (strategy use and self-monitoring), and self-reflection (self-evaluation and adaptive attributions). Formative assessment practices—particularly goal clarification, timely feedback, and self-assessment opportunities—are theorized to activate and strengthen each phase of this cycle (Nicol & Macfarlane-Dick, 2006).

The second framework is Deci and Ryan's (1985) self-determination theory (SDT), which proposes that human motivation is regulated along a continuum from amotivation through extrinsic regulation to intrinsic motivation, depending on the degree to which three basic psychological needs—autonomy, competence, and relatedness—are satisfied. High-quality formative feedback and transparent learning goals are proposed to satisfy competence and autonomy needs, thereby promoting more self-determined forms of motivation (Reeve, 2012; Vallerand et al., 1992).

2.2 Formative Assessment: Conceptual Dimensions

Black and Wiliam's (1998) landmark review of over 250 studies established formative assessment as one of the most powerful interventions available to classroom teachers, reporting effect sizes of $d = 0.40$ – 0.70 . Wiliam (2011) subsequently identified five key strategies of formative assessment:

- Clarifying and sharing learning intentions and criteria for success
- Engineering effective classroom discussions and learning tasks

- Providing feedback that moves learners forward
- Activating students as instructional resources for one another
- Activating students as owners of their own learning. These strategies have been operationalized in diverse ways across studies, generating heterogeneous effect size estimates (Kingston & Nash, 2011).

More recent work has refined the mediating role of feedback quality. Hattie and Timperley (2007), in their widely cited framework, distinguished four levels of feedback—task, process, self-regulation, and self—and argued that process- and self-regulation-level feedback produce the greatest gains in deep learning. Similarly, Shute (2008) identified elaborated, corrective, and timely feedback as the most effective formative feedback modalities for promoting understanding and persistence.

2.3 Formative Assessment and Self-Regulated Learning

Empirical evidence supports a robust positive association between formative assessment quality and SRL strategy use. Rakoczy et al. (2013) demonstrated in a randomised controlled trial involving 694 secondary students that process-focused feedback significantly increased metacognitive strategy use ($d = 0.47$) and effort regulation ($d = 0.38$) compared to outcome-focused feedback. Panadero et al. (2018), in a systematic review of 25 studies, found that self-assessment—a core formative practice—consistently enhanced self-monitoring, goal-directed behaviour, and metacognitive awareness.

In the Indian context, limited but emerging research points to similar associations. Singh and Mehta (2020) found significant correlations between teacher feedback frequency and students' self-monitoring scores ($r = .41$, $p < .01$) in a sample of Grade 7 students in Maharashtra. Nair and Joseph (2022) reported that peer-assessment training in Kerala primary schools improved students' task strategy use and self-efficacy for learning over a 12-week period.

2.4 Formative Assessment and Academic Motivation

Research drawing on SDT has consistently linked autonomy-supportive assessment environments to higher intrinsic motivation. Lepper and Henderlong (2000) demonstrated that informational, process-focused praise enhances intrinsic motivation, while controlling, outcome-focused feedback undermines it. Ryan and Deci (2017) synthesized decades of SDT research to conclude that assessment practices that support competence need satisfaction—primarily through optimal challenge and informational feedback—are critical for sustaining students' autonomous motivation.

In classroom-based experimental studies, Pulfrey et al. (2011) found that grades alone, compared to verbal feedback, significantly reduced intrinsic motivation and increased performance-avoidance goals. Conversely, formative feedback that highlighted progress and effort was found to maintain mastery goal orientations (Ames, 1992; Dweck, 2006). These findings are particularly salient in India, where high-stakes examinations and relative grading cultures may inadvertently suppress intrinsic motivation from as early as Grade 5 (Kumar & Sharma, 2021).

2.5 Gap in Literature

Despite substantial international evidence, several gaps persist. First, most intervention studies have been conducted in Western, high-resource school contexts that may not generalize to Indian government schools characterized by overcrowded classrooms, multilingual settings, and assessment illiteracy among teachers (NCERT, 2022). Second, mixed-methods designs that triangulate survey data with observational and interview evidence to illuminate mechanisms are rarely employed in this domain in India. Third, the concurrent examination of both SRL and motivation as interdependent outcomes—rather than treating them separately—has received scant attention. The present study directly addresses these gaps.

III. METHODOLOGY

3.1 Research Design

A concurrent triangulation mixed-methods design was employed (Creswell & Creswell, 2018), wherein quantitative and qualitative data were collected simultaneously, analyzed independently, and subsequently merged for interpretation. This design was chosen because the research questions require both measurement of changes in SRL and motivation (quantitative strand) and a deep understanding of the processes and mechanisms involved (qualitative strand). Equal priority was accorded to both strands, denoted as QUAN + QUAL in mixed-methods notation (Morse, 2010).

3.2 Setting and Participants

3.2.1 Quantitative Strand

Six government upper primary schools in Malappuram and Kozhikode districts of Kerala were selected through purposive sampling, ensuring variation in school size and urban/rural location. All Grade 6, 7, and 8 students enrolled in the selected schools during the 2024–2025 academic year were invited to participate ($N = 340$). After excluding students with incomplete data and those absent during pre- or post-testing, the final quantitative sample comprised 280 students (Grades 6–8; 51.1% female; mean age = 12.3 years, $SD = 0.91$).

3.2.2 Qualitative Strand

A purposive maximum variation sub-sample of 18 students (6 per grade; 3 male, 3 female; high, average, and low academic performance represented) and 12 class teachers (2 per school) participated in semi-structured interviews. Additionally, 36 classroom observations (6 per school) were conducted across Mathematics and Environmental Science lessons to document naturalistic formative assessment episodes.

3.3 Intervention: Structured Formative Assessment Programme (SFAP)

The Structured Formative Assessment Programme (SFAP) was designed by the research team in alignment with Wiliam's (2011) five formative assessment strategies and TPACK principles (Harris et al., 2009). Prior to the 16-week intervention, all participating teachers attended a 5-day (30-hour) professional development workshop covering:

- formative assessment theory and evidence,
- practical techniques (exit tickets, think-pair-share, peer feedback protocols, learning diaries, rubric-based self-assessment), and
- lesson design integrating formative checkpoints. During the intervention, teachers were required to implement a minimum of three formative assessment cycles per week per class, supported by fortnightly coaching sessions with the research team.

3.4 Instruments

3.4.1 Motiva Strategies for Learning Questionnaire (MSLQ)

The MSLQ (Pintrich et al., 1991) is a 81-item self-report instrument measuring motivational orientations and SRL strategy use on a 7-point Likert scale. For this study, eight subscales were employed: intrinsic goal orientation, extrinsic goal orientation, task value, elaboration, organisation, critical thinking, metacognitive self-regulation, and effort regulation. The MSLQ has demonstrated strong reliability and validity across diverse secondary school populations ($\alpha = .69-.93$; Pintrich et al., 1991). In the present sample, composite reliability ranged from $\alpha = .72$ to $.91$.

3.4.2 Academic Motivation Scale – College Version (AMS-C 28)

The AMS-C 28 (Vallerand et al., 1992), adapted for upper primary students, measures seven types of academic motivation across a 7-point scale: intrinsic motivation to know, to accomplish things, and to experience stimulation; identified, introjected, and external regulation; and amotivation. Confirmatory factor analysis in the present sample supported the original seven-factor structure (CFI = .93, RMSEA = .061, SRMR = .055). Internal consistency ranged from $\alpha = .76$ to $.88$.

3.4.3 Formative Assessment Quality Index (FAQI)

A 20-item student-reported instrument was developed by the research team to assess perceived quality of formative assessment practices (feedback quality, goal clarity, peer assessment, self-assessment opportunities). Content validity was confirmed (CVI = .91). Exploratory factor analysis yielded a four-factor structure explaining 62.4% of variance ($\alpha = .85$).

3.5 Qualitative Data Collection

3.5.1 Semi-Structured Interviews

Individual interviews were conducted with 18 students (30–40 minutes each) and 12 teachers (45–60 minutes each) using interview guides developed from the literature and refined through two pilot interviews. Interviews were audio-recorded with participant consent, transcribed verbatim, and translated from Malayalam to English where necessary by a bilingual research assistant, with back-translation for quality checks.

3.5.2 Classroom Observations

Thirty-six non-participant observations were conducted using a structured observation checklist adapted from the Classroom Assessment Scoring System (CLASS; Pianta et al., 2008). Field notes captured formative assessment episodes, teacher-student interactions, and indicators of student engagement. Observer reliability was assessed using Cohen's kappa ($\kappa = .81$), indicating strong inter-rater agreement.

3.6 Quantitative Analysis

Paired samples t-tests and repeated measures ANCOVA (controlling for baseline scores) were used to examine pre-to-post changes in MSLQ and AMS subscales. Pearson correlations were computed between posttest FAQI scores and SRL/motivation outcomes to address RQ3 (quantitative component). Effect sizes were reported as Cohen's d for t-tests and partial eta-squared (η^2p) for ANCOVA. Multiple regression analysis was used to identify predictors of posttest SRL strategy use. All quantitative analyses were conducted using IBM SPSS Statistics Version 28.0 (IBM Corp., 2021) at $\alpha = .05$.

3.7 Qualitative Analysis

Interview transcripts and observation field notes were analyzed using reflexive thematic analysis following Braun and Clarke's (2006) six-phase framework:

- Familiarization with data
- Generating initial codes
- Constructing themes
- Reviewing themes
- Defining and naming themes
- Producing the report. Nvivo 14 software (lumivero, 2023) facilitated systematic coding.

Credibility was enhanced through prolonged engagement, member checking with six participants, and reflexive memos maintained throughout analysis. Transferability was addressed through thick description of the research context.

3.8 Mixed-Methods Integration

Quantitative and qualitative findings were integrated at the interpretation stage using a joint display matrix (Creswell & Creswell, 2018), in which quantitative outcomes and corresponding qualitative themes were placed side by side to identify convergence, divergence, and complementarity. Points of divergence prompted additional interpretive analysis.

3.9 Ethical Considerations

Ethical approval was obtained from the Institutional Ethics Committee of the University of Calicut (Ref. No. UOC-IEC-2024-019). Written informed consent was secured from school principals and parents or guardians. Student assent was obtained from all participants. Confidentiality was maintained through anonymization; pseudonyms are used throughout qualitative reporting. Participation was entirely voluntary, and withdrawal did not affect students' academic standing.

VI. RESULTS

4.1 Descriptive Statistics and Baseline Characteristics

At baseline, students in the study reported moderate SRL strategy use (MSLQ composite $M = 4.21$, $SD = 0.84$) and predominantly extrinsic motivational orientations (AMS external regulation $M = 5.12$, $SD = 0.97$; intrinsic motivation to know $M = 3.87$, $SD = 1.02$). Significant grade-level differences were observed at baseline for metacognitive self-regulation ($F(2, 277) = 7.34$, $p = .001$), with Grade 8 students reporting higher baseline scores ($M = 4.58$, $SD = 0.91$) than Grade 6 students ($M = 3.97$, $SD = 0.88$). These grade differences were controlled in subsequent analyses.

4.2 Research Question 1: Effects on Self-Regulated Learning

Repeated measures ANCOVA revealed a significant main effect of time (pre vs. post) on composite SRL strategy use, $F(1, 278) = 67.42$, $p < .001$, $\eta^2p = .20$. The posttest composite SRL score ($M = 4.89$, $SD = 0.78$) was significantly higher than the pretest score ($M = 4.21$, $SD = 0.84$). Subscale-level analyses indicated particularly large improvements in metacognitive self-regulation ($d = 0.91$, $p < .001$), elaboration strategies ($d = 0.78$, $p < .001$), and effort regulation ($d = 0.69$, $p < .001$). Critical thinking showed the smallest but still significant improvement ($d = 0.41$, $p < .001$). Null hypothesis H_{01} was rejected.

4.3 Research Question 2: Effects on Academic Motivation

Paired samples t-tests revealed significant pre-to-post improvements in intrinsic motivation to know ($t(279) = 9.74$, $p < .001$, $d = 0.83$), intrinsic motivation to accomplish things ($t(279) = 8.61$, $p < .001$, $d = 0.77$), and identified regulation ($t(279) = 6.23$, $p < .001$, $d = 0.55$). Extrinsic motivation showed a non-significant decline ($t(279) = -1.84$, $p = .067$, $d = -0.17$), while amotivation decreased significantly ($t(279) = -5.49$, $p < .001$, $d = -0.48$). These patterns collectively indicate a shift along the SDT motivational continuum toward greater self-determination. Null hypothesis H_{02} was rejected.

4.4 Research Question 3 – Quantitative Component: FAQI Correlations

Pearson correlation analyses revealed significant positive associations between posttest FAQI total scores and composite SRL strategy use ($r = .58$, $p < .001$, 95% CI [.49, .66]), intrinsic motivation to know ($r = .51$, $p < .001$), and metacognitive self-regulation ($r = .54$, $p < .001$). Multiple regression analysis with FAQI subscales as predictors of posttest SRL composite (controlling for pretest SRL) yielded a significant model ($F(5, 273) = 34.71$, $p < .001$, $R^2 = .39$). Feedback quality ($\beta = .31$, $p < .001$) and self-assessment opportunities ($\beta = .27$, $p < .001$) were the strongest independent predictors. Null hypothesis H_{03} was rejected.

4.5 Qualitative Findings: Mechanisms Linking Formative Assessment to SRL and Motivation

Theme 1: Feedback as a Compass for Learning. Across student and teacher interviews, quality feedback emerged as the primary mechanism through which formative practices activated SRL. Students described how specific, process-focused comments helped them understand not only what was wrong but how to improve. One Grade 7 student explained that when the teacher writes comments on the work—not just a tick or cross—it helps to understand what to do next time. Teachers similarly noted that shifting from grade-only feedback to written comments initially required additional effort but produced visible changes in students' revision behaviours and homework quality within four weeks.

Theme 2: Goal Transparency as a Motivational Catalyst. Classroom observations consistently documented that lessons in which teachers explicitly stated learning goals and success criteria at the outset were characterized by higher student on-task behaviour and more frequent voluntary question-asking. Teachers reported that sharing learning intentions in student-friendly language—a departure from standard textbook-driven lesson delivery—reduced anxiety and increased perceived relevance. A Grade 6 teacher described the approach: when students know exactly what we expect by the end of the lesson, they stop feeling lost and start actually trying.

Theme 3: Peer Assessment and Social Learning. Peer assessment protocols introduced during the SFAP were identified by both students and teachers as transformative for collaborative engagement and self-evaluation skills. Students reported that marking a classmate's work made them more aware of their own mistakes. Observation data corroborated elevated levels of student-to-student academic discourse during structured peer feedback sessions relative to whole-class instruction episodes. This finding aligns with Vygotsky's (1978) sociocultural emphasis on the role of social interaction in cognitive development.

Theme 4: Tension Between Formative Practices and Examination Culture. A divergent theme across teacher interviews was the perceived conflict between time invested in formative practices and preparation for high-stakes district-level

examinations. Several teachers expressed concern that extended peer assessment or learning diary activities reduced syllabus coverage time. This tension is consistent with findings from Kumar and Sharma (2021) who documented similar examination-formative assessment conflicts in Indian secondary schools and represents a key implementation challenge requiring structural intervention at policy level.

4.6 Integration: Joint Display of Quantitative and Qualitative Findings

Integration of findings through a joint display matrix revealed strong convergence between quantitative improvements in metacognitive self-regulation and the qualitative *Theme 1* (Feedback as a Compass), suggesting that feedback quality is the primary active ingredient producing SRL gains. The quantitative shift toward intrinsic motivation aligned with *Theme 2* (Goal Transparency), affirming SDT predictions that competence-supportive practices enhance autonomous motivation (Deci & Ryan, 1985). The divergent theme regarding examination culture was not reflected in the quantitative data, likely because outcome measures assessed student-level changes rather than implementation barriers, highlighting a complementary rather than contradictory relationship between data strands.

V. DISCUSSION

5.1 Interpretation of Quantitative Findings

The significant improvements in SRL strategy use, particularly in metacognitive self-regulation ($d = 0.91$), are among the largest reported in formative assessment intervention studies, exceeding typical effect sizes from meta-analyses ($d = 0.40$ – 0.70 ; Black & Wiliam, 1998). This magnitude may be partly explained by the relatively low baseline SRL proficiency in the sample, consistent with evidence that formative practices yield larger gains when students lack pre-existing metacognitive skills (Panadero et al., 2018). The 30-hour teacher professional development component and fortnightly coaching likely contributed to high implementation fidelity, a known moderator of formative assessment effectiveness (Kingston & Nash, 2011).

The motivational findings—specifically the significant increase in intrinsic motivation and decrease in amotivation—are consistent with SDT predictions (Deci & Ryan, 1985; Ryan & Deci, 2017). The SFAP's emphasis on goal transparency, informational feedback, and student ownership of learning may have satisfied students' fundamental psychological needs for competence and autonomy, thereby shifting motivational regulation toward more self-determined forms. The non-significant decline in extrinsic motivation is noteworthy; it suggests that formative practices did not simply substitute extrinsic for intrinsic motivation but rather added a layer of autonomous motivation alongside existing external regulatory orientations, a pattern theoretically consistent with internalisation processes described by Ryan and Deci (2017).

5.2 Mechanisms: Qualitative Insights

The qualitative strand provided important mechanistic insights that the quantitative data alone could not reveal. The identification of feedback quality as a compass for learning aligns with Hattie and Timperley's (2007) process- and self-regulation-level feedback as the most effective modalities. Students' descriptions of using teacher comments to guide revision behaviour are consistent with the performance phase of Zimmerman's (2002) SRL model, indicating that formative feedback directly activated self-monitoring and adaptive strategy use.

The finding that goal transparency functioned as a motivational catalyst extends Ames' (1992) mastery-goal research to the Indian classroom context. When students understand the criteria for success, they are more likely to adopt learning goals and persist through difficulty, consistent with Dweck's (2006) implicit theory framework. The examination-culture tension identified by teachers represents a structural barrier that requires systemic rather than classroom-level intervention, echoing calls by the NEP 2020 for radical reform of the examination system at the primary level (Ministry of Education, 2020).

5.3 Implications for Policy and Practice

The findings carry direct implications for teacher education and school policy. Pre-service teacher preparation programmes under the NCFTE (2023) should systematically incorporate formative assessment literacy training, including practical skill-building in designing feedback, facilitating peer assessment, and constructing learning goals in student-accessible language. At the school-system level, the structural tension between formative practice time and examination preparation urgently requires curriculum de-loading and redistribution of high-stakes assessment pressure, as envisioned under NEP 2020's competency-based progression framework. District education officers should consider integrating the SFAP model into in-service training under the Samagra Shiksha Abhiyan national programme.

5.4 Limitations

Several limitations should be acknowledged. First, the absence of a no-treatment control group limits causal inference, as pre-to-post improvements could partly reflect maturation, testing effects, or regression to the mean. Future research should employ randomised controlled designs. Second, the study was conducted in Kerala, a state with above-average educational infrastructure and teacher literacy relative to other Indian states, potentially limiting generalizability. Third, the reliance on self-report measures for SRL and motivation introduces social desirability and recall biases. Future studies should triangulate with performance-based SRL measures (e.g., think-aloud protocols, learning diary analysis). Fourth, qualitative data were collected only from six schools, limiting the range of institutional contexts represented.

5.5 Future Research Directions

Future research should employ randomised cluster trials with active control conditions to establish causal efficacy. Longitudinal studies tracking students across Grades 6–10 would illuminate whether formative-assessment-induced SRL gains

are sustained and whether they predict long-term academic achievement and post-secondary transitions. Comparative research across Indian states with varying educational resource profiles—including states with lower teacher-training investment—is needed to establish boundary conditions. Finally, technology-supported formative assessment platforms (e.g., AI-powered adaptive feedback systems) represent a promising frontier deserving systematic investigation in the Indian primary school context (Means et al., 2013).

VI. CONCLUSION

This mixed-methods study provides robust evidence that structured formative assessment practices significantly enhance self-regulated learning strategy use and intrinsic academic motivation among upper primary school students in Indian government schools. Grounded in Zimmerman's SRL model and Deci and Ryan's self-determination theory, the findings demonstrate that targeted teacher professional development, combined with systematic formative assessment implementation, produces substantial shifts in students' metacognitive regulation, goal orientation, and motivational self-determination. Qualitative evidence illuminates the mechanisms involved—feedback quality, goal transparency, and peer assessment—and identifies the structural examination-culture tension as a key implementation barrier requiring systemic policy redress. As India pursues the transformative vision of NEP 2020, scaling evidence-based formative assessment practices through teacher education reform and curriculum de-loading represents one of the highest-leverage strategies available to improve the quality and equity of upper primary education.

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