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PARENTAL BELIEFS AND PRACTICES IN LITERACY, NUMERACY, AND SCIENCE: A THEMATIC DISCUSSION

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RESEARCH ARTICLE

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Abstract

Foundational literacy and numeracy (FLN) are globally recognized as critical predictors of lifelong learning, with early parental beliefs and practices playing a decisive role in shaping children's literacy, numeracy, and science outcomes. International frameworks (Griffin, 1998; Scarborough, 2001; Ziegler & Goswami, 2005) and Indian research (Srivastava, 2007; Gupta, 2022; ASER Centre, 2024) collectively demonstrate that the home environment, parental involvement, and language of instruction significantly influence learning trajectories. Thematic synthesis reveals four main dimensions: (1) literacy development is strongly associated with home literacy environments and parental belief systems; (2) parental numeracy practices, often undervalued, directly predict children's mathematical competence; (3) parental encouragement shapes children's sustained interest in science and STEM, with gender differences evident; and (4) broader parental involvement and autonomy support enhance children's motivation, academic adjustment, and long-term outcomes. Evidence from large-scale assessments (NAS 2021; NCERT, 2022) and interventions (NIPUN Bharat, UNICEF, 2022) underscores the urgency of parental engagement in mitigating socio-economic gaps and post-pandemic learning loss. Together, these findings position parental beliefs and practices as pivotal levers for educational equity and foundational learning recovery in India.

Keywords: *Parental Beliefs; Foundational Literacy and Numeracy; Home Learning Environment; Academic Outcomes*

Introduction

The importance of foundational literacy and numeracy (FLN) in the early years has been extensively emphasized across global and Indian contexts. Griffin (1998) emphasized that preventing reading difficulties requires early intervention and a strong foundation in literacy, while Scarborough (2001) linked early language and literacy skills to later reading abilities, highlighting the continuity of learning trajectories. Similarly, Ziegler and Goswami's (2005) Psycholinguistic Grain Size Theory explained how children's reading acquisition varies across languages, highlighting the challenges faced in multilingual environments.

In multilingual contexts such as India, parental and school language practices play a crucial role. Studies such as Srivastava (2007) and Biseth (2009) underline the complexities of multilingual education, noting both opportunities and challenges in promoting democratic and inclusive schooling. The World Bank (2021) and UNESCO (2016) emphasize that the language of instruction significantly impacts learning outcomes, with mother tongue-based education often proving more effective. Nakamura and Hoop (2014), in their FRAME-India study, showed how reading acquisition strategies must adapt to multilingual realities, while Gupta (2022) critiqued India's borrowing of global policy models and the tension with local needs.

Globally, reports by UNICEF (2022), UNESCO, UNICEF & World Bank (2021), and the Foundational Learning Study (2022) reveal a widespread learning crisis, with millions of children failing to achieve minimum FLN competencies. In India, initiatives like NIPUN Bharat (NCERT, 2022), toy-based pedagogy (Jaadui Pitara), and Ennum Ezhuthum Mission in Tamil Nadu aim to strengthen foundational learning. Yet, challenges such as a shortage of qualified teachers (Times of India, 2022), pandemic-induced learning losses (Indian Express, 2022), and socio-economic disparities persist.

Recent discourse also emphasizes the integration of nutrition, parental engagement, and digital learning into FLN strategies (UNICEF, 2020; WEF-UNICEF-Yuwaah, 2022). Evidence suggests that holistic interventions—combining teacher capacity, community participation, and child-centered pedagogy – are most effective in addressing the FLN crisis (Sarangapani et al., 2021; Central Square Foundation, 2022).

Thematic Analysis

Literacy & Numeracy Foundations: ASER's annual surveys reveal persistent deficiencies in basic literacy and numeracy, often correlated with lower parental education and weak home support systems (ASER Centre, 2024). Evaluations such as PAHAL show that active parent–teacher engagement leads to substantial gains in learning, especially for children starting with lower skills (Aysa, 2022).

Parental Interventions and Impact: UNICEF's pilot studies demonstrate that investing in home learning environments and building parental confidence can sustain learning during disruptions like COVID (UNICEF India, 2024). Maternal literacy programs further enhance early learning readiness (Banerji, 2017). Longitudinal evidence from IHDS shows that lack of parental involvement—like not attending PTA or supervising homework—significantly increases school dropout risk (Paul et al., 2021).

Motivation, Behavior, and Gender Dynamics: Research by Parmar & Nathans (2022) establishes that parental warmth and involvement are strong predictors of academic success and fewer behavior issues, with notable gender-specific patterns. Das & Singhal (2021) found enduring gender gaps in basic math skills tied to societal norms, persisting across social strata.

System-Level Insights: The NAS 2021 findings call for greater parental engagement to rectify systemic learning deficits (NCERT, 2021). Kumar (2023) underscores that gains in literacy and numeracy significantly reduce dropout risk, driving home the case for early FLN investments by families. Post-pandemic, ASER reports show a sluggish and unequal rebound in learning, especially affecting rural, marginalized, and female learners (iDream, 2025).

Literacy and the Home Environment: Research on literacy has consistently highlighted the role of the home literacy environment (HLE) and parental beliefs. Early work emphasized maternal belief systems as critical predictors of children's engagement with reading (DeBaryshe, 1995). Shared reading practices and supportive parental attitudes were shown to enhance children's motivation for reading (Baker & Scher, 2002; Ortiz, Stowe, & Arnold, 2001). Cross-cultural research demonstrated that children's emerging literacy skills were strongly associated with the richness of the HLE (Weigel, Martin, & Bennett, 2006; Yeo, Ong, & Ng, 2014). More recently, interventions such as book giveaway programs have been shown to improve literacy outcomes, especially when accompanied by parental involvement (de Bondt, Willenberg, & Bus, 2020). Altun, Tantekin-Erden, and Hartman (2022) confirmed that maternal factors and the HLE strongly predict positive attitudes toward reading among preliterate children.

Numeracy Beliefs and Practices: The literature also underscores how parental beliefs shape children's numeracy. Early studies documented how the frequency of number-related activities at home correlated with children's math performance (Blevins-Knabe & Musun-Miller, 1996; Skwarchuk, 2009). Parents often emphasized language learning over mathematics, perceiving math as a school-based subject (Cannon & Ginsburg, 2008). Subsequent studies linked home numeracy practices with school math performance across cultural contexts (LeFevre et al., 2009, 2010). Research also showed that parental math beliefs predicted children's participation in numeracy activities (Sonnenschein et al., 2012; Missall et al., 2015). Interventions such as parent–child number board games improved children's numeracy skills and math interest (Cheung & McBride, 2017). Recent cross-cultural studies highlighted how parents' characteristics and home environments predicted numeracy skills even in resource-limited contexts (Cheung, Dulay, & McBride, 2020; Hao et al., 2022).

Parental Influence on Science and STEM: Science-related beliefs and practices have been less studied but reveal similar trends. Chen (2001) showed that Chinese parents held stronger expectations for science achievement than American parents, influencing children's engagement. Jacobs and Bleeker (2004) found parental encouragement critical to sustaining children's interest in math and science, though girls' interest in science was more fragile. Later, Hoferichter and Raufelder (2019) demonstrated that maternal and paternal support influenced adolescents' STEM outcomes differently by gender, highlighting the complexity of parental influence.

Parental Involvement, Motivation, and Academic Adjustment: Beyond subject-specific domains, parental involvement more broadly influences children's adjustment and motivation. Classic frameworks such as Bronfenbrenner's ecological systems theory (1979) situate parental practices within broader social contexts. Longitudinal studies confirmed that parent involvement in early interventions leads to improved achievement and reduced grade retention (Miedel & Reynolds, 1999). Tools like the Family Involvement Questionnaire (Fantuzzo, Tighe, & Childs, 2000) provided multidimensional measures of participation, showing that higher involvement predicts stronger academic outcomes. Studies also emphasize the role of parental resources and autonomy support in shaping children's motivation and adjustment (Grolnick, Kurowski, Dunlap, & Hevey, 2000; Lerner & Grolnick, 2020). Large-scale meta-analyses further confirmed that parental involvement is positively associated with academic achievement and well-being across contexts (Barger, Kim, Kuncel, & Pomerantz, 2019).

Conclusion

This review establishes that parental beliefs and practices are central to children's learning in literacy, numeracy, and science across diverse contexts, including multilingual India. Literacy outcomes are strongly shaped by the richness of the home environment, shared reading practices, and supportive parental attitudes, while numeracy development depends on both structured and informal number-related interactions. Parents' encouragement and expectations also sustain children's interest in science and STEM, though gender disparities persist. Beyond subject-specific learning, active parental involvement enhances motivation, reduces dropout risks, and promotes holistic development. Indian evidence, particularly from ASER surveys, NAS assessments, and national initiatives such as NIPUN Bharat, demonstrates that strengthening parent–school partnerships is

critical to addressing foundational learning deficits. In the post-pandemic landscape, holistic approaches – integrating teacher capacity, mother-tongue instruction, community participation, and digital or toy-based pedagogy – hold promise for equitably rebuilding FLN. Ultimately, aligning parental practices with systemic reforms will be essential for achieving India's educational goals and ensuring that every child attains foundational competencies by the early grades.

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