

Effect of Foundational Literacy and Numeracy in the Achievement of Foundational Stage Competencies in Odisha

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Abstract: Foundational literacy and numeracy (FLN) play a crucial role in the cognitive and socio-emotional development of children. In Odisha, efforts have been made to enhance FLN through various government and non-government initiatives, particularly under the National Initiative for Proficiency in Reading with Understanding and Numeracy (NIPUN Bharat). This research aims to analyze the impact of FLN on the achievement of foundational stage competencies in Odisha. A mixed-method approach, combining quantitative surveys and qualitative case studies, was used to evaluate FLN levels among children in early grades. The findings suggest a significant correlation between FLN proficiency and competency attainment in literacy and numeracy. Policy implications and recommendations for improving FLN interventions are discussed.

Keywords: Foundational Literacy and Numeracy, Early Childhood Education, Foundational Stage Competencies, Educational Achievement, Odisha, Learning Outcomes

I. INTRODUCTION

Foundational Literacy and Numeracy (FLN) is a critical determinant of a child's overall cognitive and socio-emotional development. The early years of education serve as the building blocks for future learning and academic success. The National Education Policy (NEP) 2020 in India emphasizes the need for strong FLN skills to ensure students develop essential reading, writing, and arithmetic skills at the foundational stage. In Odisha, various government initiatives, including the NIPUN Bharat Mission, have been implemented to strengthen FLN among young learners. However, disparities persist due to socioeconomic and infrastructural constraints, affecting learning outcomes across different demographic groups.

Foundational Literacy and Numeracy (FLN) in Odisha is a dedicated program focused on developing basic reading, writing and mathematical skills in young children, primarily in Classes 1-3, with the aim of addressing critical learning gaps at the grassroots level within the state; Odisha has actively implemented FLN initiatives in recent years, reflecting a commitment to improving foundational education across the region.

Foundational literacy and numeracy (FLN) are essential skills that enable children to read, write, and perform basic arithmetic, serving as the cornerstone of their educational journey. The ability to effectively acquire and apply these skills is critical in determining a child's overall academic performance and future success. Recognizing the critical role of FLN, the National Education Policy (NEP) 2020 has prioritized its attainment by Grade 3 to ensure equitable and inclusive education for all.

In Odisha, significant efforts have been made to implement FLN programs as part of broader educational reforms. State initiatives, such as teacher training, community engagement, and resource allocation, aim to address challenges such as high dropout rates and learning gaps. However, despite these interventions, inequities in learning outcomes persist, especially among children from marginalized communities.

This research investigates the impact of FLN on the achievement of foundational stage competencies in Odisha. By assessing the effectiveness of FLN programs and identifying key challenges, the study aims to provide policy recommendations for improving early education outcomes. A mixed-method approach is used, incorporating

quantitative assessments and qualitative insights from teachers and parents, to gain a comprehensive understanding of the factors influencing FLN proficiency and competency attainment.

2. Conceptual Framework of Foundational Literacy and Numeracy (FLN)

The importance of Foundational Literacy and Numeracy (FLN) in fostering academic growth and development has been widely recognized by educationists. FLN plays a crucial role in preparing students for further learning in the subsequent stages of education, acting as the bedrock upon which all future academic achievements are built. According to the UDISE 2019-20 report, India has a vast network of Anganwadi centers, with approximately 13.87 lakh centers enrolling 3.46 crore children aged 3 to 6 years, and an additional 25 crore children enrolled across 15 lakh schools, including government, government-aided, and private institutions.

Despite this large enrollment, the National Achievement Survey (NAS) 2017 highlighted concerns about the quality of education at the foundational level. It found that around 17% of Class III students performed below the basic level in language and numeracy skills. This significant gap in foundational skills prompted the formulation of a new curriculum and pedagogical framework by the National Education Policy (NEP) 2020 for foundational, elementary, middle, and secondary stages of education.

FLN is defined in policy documents as the essential skills of reading, writing, and mathematics that every child should acquire by the end of Class III. The aim is for students to be able to read and understand simple texts and perform basic arithmetic operations by the time they complete their foundational years. These competencies are considered fundamental for academic progression and life skills.

3. Literature Review

Banerjee et al. (2021) Banerjee and colleagues examined the impact of community-driven literacy programs in Odisha. Their findings suggest that integrating local languages and culturally relevant materials significantly improved early-grade reading scores. The study emphasized the importance of contextualizing FLN interventions to meet the specific needs of the region.

ASER Centre (2020) The Annual Status of Education Report (ASER) focused on foundational learning levels in rural Odisha. According to the report, only 35% of Grade 3 children could read Grade 2-level text, and 28% could perform basic subtraction. The report underscored the critical need for focused FLN programs to bridge these learning gaps.

Pratham Education Foundation (2019) This study evaluated the outcomes of remedial education programs in Odisha's government schools. Results showed that short-term, targeted interventions led to measurable improvements in numeracy skills among Grade 1 and Grade 2 students. The study highlighted the role of well-trained facilitators in achieving these results.

Nambissan (2018) Nambissan's work explored the role of socioeconomic factors in educational outcomes. She noted that children from marginalized communities in Odisha faced compounded challenges due to inadequate resources and teacher shortages. The research pointed to the need for equity-focused FLN policies to address these systemic issues.

Singh et al. (2022) Singh et al. analyzed digital FLN initiatives during the COVID-19 pandemic. In Odisha, the study found that access to digital tools and content improved foundational competencies in literacy and numeracy for students with internet access. However, the digital divide exacerbated learning inequalities among rural and urban populations.

National Council of Educational Research and Training (NCERT) (2021) NCERT's review of the National Education Policy 2020's implementation in Odisha highlighted the role of the NIPUN Bharat Mission in enhancing FLN. The report documented pilot projects that achieved positive outcomes by integrating activity-based learning with continuous teacher training.

4. Objectives

- To assess the current status of foundational literacy and numeracy among children in the foundational stage in Odisha.

- To examine the relationship between FLN skills and the achievement of foundational competencies.
- To analyze the effectiveness of existing FLN interventions in Odisha
- To identify challenges and opportunities in implementing FLN programs.
- To suggest policy recommendations for improving FLN outcomes in Odisha.

5. Hypothesis

- H1: There is a positive correlation between foundational literacy and numeracy skills and the achievement of foundational stage competencies.
- H2: Students exposed to structured FLN programs perform better in foundational competencies than those without such interventions.
- H3: Socioeconomic factors and teacher training significantly influence FLN outcomes in Odisha.

6. Research Methodology Research Design:

This study employs a **mixed-method approach**, integrating both **quantitative** and **qualitative** methodologies to provide a comprehensive analysis.

Sample Selection:

- A total of **500 students** from Grades 1 to 3 were selected across **urban, rural, and tribal** regions of Odisha.
- **50 teachers and 30 school administrators** were interviewed to understand FLN challenges and best practices.

Data Collection Methods:

- **Quantitative Survey:** Standardized assessments of literacy and numeracy were conducted to measure student proficiency.
- **Interviews and Focus Group Discussions (FGDs):** Teachers, parents, and education officers provided insights into FLN implementation.
- **Observation:** Classroom practices and teaching methodologies were observed to evaluate FLN interventions.

Data Analysis:

- **Statistical Analysis:** Correlation and regression analysis were used to examine the relationship between FLN levels and foundational competency achievements.
- **Qualitative Analysis:** Thematic analysis was conducted to interpret interviews and classroom observations.
- **Hypothesis Testing:** Statistical tests such as Pearson correlation and ANOVA were conducted to validate the proposed hypotheses.

7. Results and Discussion

Objective 1: Assess the Current Status of Foundational Literacy and Numeracy (FLN) in Odisha Descriptive Statistics of FLN Scores

Region	Average Literacy Score (out of 100)	Average Numeracy Score (out of 100)
Urban	72.5	74.3
Rural	58.2	60.1
Tribal	45.7	47.9

Data Interpretation

Urban students performed significantly better in both literacy and numeracy compared to rural and tribal students. The lowest performance was observed among tribal students, indicating a need for targeted interventions.

Objective 2: Relationship Between FLN Skills and Foundational Competencies

Hypothesis H1: There is a positive correlation between FLN skills and foundational competencies. Correlation Analysis

Variable	Correlation Coefficient (r)
Literacy vs. Competency Score	0.78 (Strong Positive)
Numeracy vs. Competency Score	0.74 (Strong Positive)

Data Interpretation

A strong positive correlation between FLN skills and competency achievement supports

Hypothesis H1.

This indicates that higher literacy and numeracy skills contribute to improved foundational competencies.

Objective 3: Effectiveness of FLN Interventions

Hypothesis H2: Students exposed to structured FLN programs perform better in foundational competencies than those without such interventions.

Comparison of Competency Scores Between Students with and without FLN Programs

Group	Average Competency Score (out of 100)
With FLN Program	78.9
Without FLN Program	55.2

ANOVA Test Results

Source	df	F-value	p-value
FLN Program	1	18.56	< 0.001

Data Interpretation

Students who participated in structured FLN programs outperformed those who did not, supporting **Hypothesis H2**.

The statistical significance ($p < 0.001$) indicates that FLN interventions have a strong impact on competency achievement.

Objective 4: Challenges and Opportunities in Implementing FLN Programs

Hypothesis H3: Socioeconomic factors and teacher training significantly influence FLN outcomes in Odisha.

Key Themes from Qualitative Data (Teacher & Administrator Interviews)

Challenges	Opportunities
Lack of trained teachers	Increased government support for FLN
Inadequate learning materials	Community engagement in education
Socioeconomic disparities affecting learning	Digital learning initiatives

Regression Analysis of Socioeconomic Factors and FLN Outcomes

Predictor Variable	Beta Coefficient (β)	p-value
Household Income	0.52	< 0.001
Parental Education Level	0.48	< 0.001
Teacher Training Hours	0.63	< 0.001

Data Interpretation

Teacher training and socioeconomic factors significantly impact FLN outcomes, supporting

Hypothesis H3.

Strengthening teacher training and leveraging technology can help bridge FLN gaps.

Objective 5: Policy Recommendations

Targeted FLN Programs: Focus on tribal and rural areas where FLN scores are lowest.

Enhanced Teacher Training: Implement continuous professional development programs.

Curriculum Improvement: Develop interactive and localized learning materials.

Technology Integration: Utilize digital tools to improve accessibility

Community Involvement: Strengthen school-community partnerships to support learning.

Quantitative Findings:

Variable	Urban (%)	Rural (%)	Tribal (%)
Literacy Proficiency	77	55	42
Numeracy Proficiency	72	50	39
FLN Program Exposure	85	60	45

Students with access to structured FLN programs performed **30% better** in competency assessments than those without structured interventions.

Socioeconomic background, parental involvement, and teacher qualifications were significant predictors of FLN achievement.

Hypothesis Testing Results:

Hypothesis	Test Used	p-value	Result
H1: FLN positively correlates with competency achievement	Pearson Correlation	0.001	Accepted
H2: FLN program exposure improves competency performance	ANOVA	0.005	Accepted
H3: Socioeconomic factors influence FLN outcomes	Regression Analysis	0.002	Accepted

Qualitative Findings:

Teachers reported challenges such as **high student-teacher ratios, lack of teaching materials, and insufficient FLN training.**

Parental support and home learning environments were identified as critical factors influencing FLN outcomes.

Tribal and rural students faced language barriers, making it difficult to grasp foundational concepts.

II. CONCLUSION AND RECOMMENDATIONS

The study highlights the positive impact of FLN on foundational stage competencies while identifying key gaps and challenges in Odisha’s FLN landscape. Policy recommendations include:

- Strengthening teacher training programs to enhance FLN delivery.
- Developing localized and multilingual FLN materials to address linguistic barriers.
- Enhancing parental engagement through community-based learning initiatives.
- Increasing investments in digital and physical learning resources for rural and tribal schools.
- Implementing periodic FLN assessments to monitor progress and improve interventions.
- The study highlights significant disparities in FLN skills across different regions.
- Strong positive correlations between FLN and competency achievements suggest a crucial role of foundational education.
- Structured FLN programs have demonstrated effectiveness in improving learning outcomes.
- Addressing challenges through policy-level changes can enhance FLN outcomes in Odisha.

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