Empowering Dreams - The Role of Free STEM Education in the Lives of Underprivileged First-Generation Children

A Mixed-Methods Study on Holistic NGO Interventions in India

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Visual: Photo of students in a classroom or NGO setting.

Research Problem

- Why Important?

- **Students from the economically weaker section don’t have the resources to fulfill their dreams of higher studies.**

- 93% dropout rate among low-income students (2012–2019) due to financial pressures (68%), parental non-cooperation (22%).

Objectives/Hypothesis

1. Assess impact of free guidance on academic resilience (ERI: Persistence, Stress Coping, Goal Orientation).
2. Propose an Educational Ecosystem Model for systemic change.
3. Analyze ROI of NGO-led interventions (SROI = 7.31:1).

Literature Gap

- Past research focuses on grades/dropouts; misses emotional scaffolding and family engagement.
- Theoretical Lens: Systems Theory + Critical Pedagogy.

Research Design

- Mixed Methods:
  - Quantitative: ERI scores (pre/post), academic records.
  - Qualitative: Case studies (n=33), interviews.

Data Collection

- Sources:
  - Surveys (Likert-scale ERI metrics).
  - School records (attendance, grades).
  - Alumni testimonials (YouTube videos).

Analysis Techniques

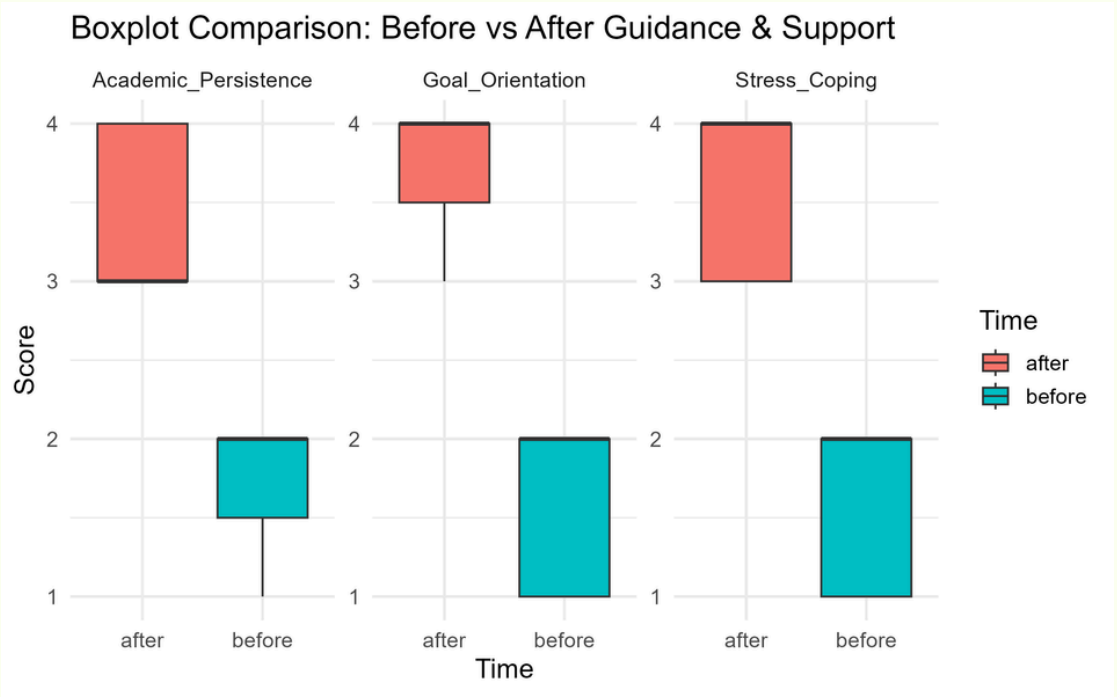
- Statistical Tools: Paired t-tests (R programming), Cohen's d for effect sizes.
- Qualitative: Case Studies

```r
# Paired t-tests for each factor
cat("===== Paired t-tests on Student Development Factors =====\n")

# Academic Persistence
t1 <- t.test(merged_data$Academic_Persistence_before, merged_data$Academic_Pe
cat("\n Academic Persistence:\n")
print(t1)

# Stress Coping
t2 <- t.test(merged_data$Stress_Coping_before, merged_data$Stress_Coping_afte
cat("\n Stress Coping:\n")
print(t2)
```

Key Findings

Quantitative Results (ERI Improvements)

- Academic Persistence: d = 3.87 (Pre:1.71 → Post:3.86).
- Stress Coping: d = 4.46 (Pre:1.57 → Post:3.71).

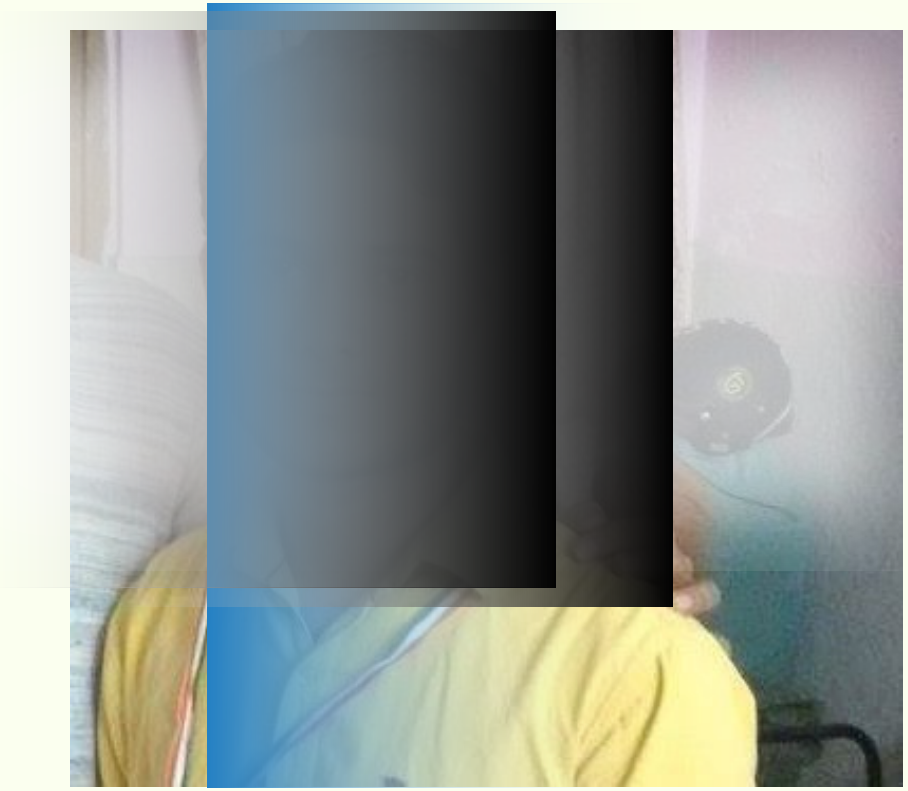


Dropout Rate & Retention Strategies

- 93% dropout (2012–2019); reduced to 41% post-2015 with free meals, metro passes.

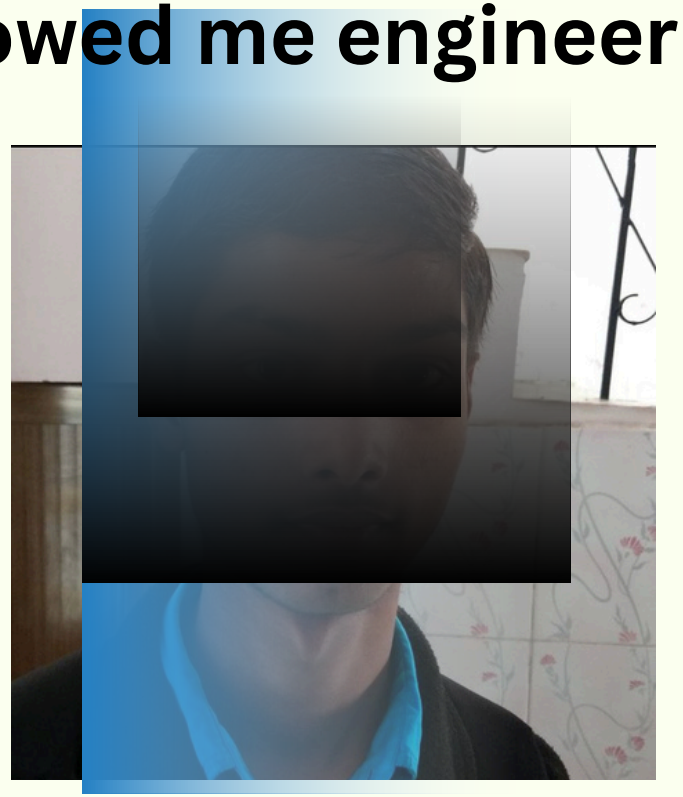
Case Study – James

- Background: Father = security guard; no coaching access.
- Intervention: Mentorship + emotional support.
- Outcome: Cleared JEE, 99% in Math.



Case Study – Ricky

- Background: Vegetable seller’s son; unstable income.
- Intervention: Scholarship + housing support.
- Outcome: Top engineering college.
- Quote: “UDGAM showed me engineering wasn’t just for rich kids.

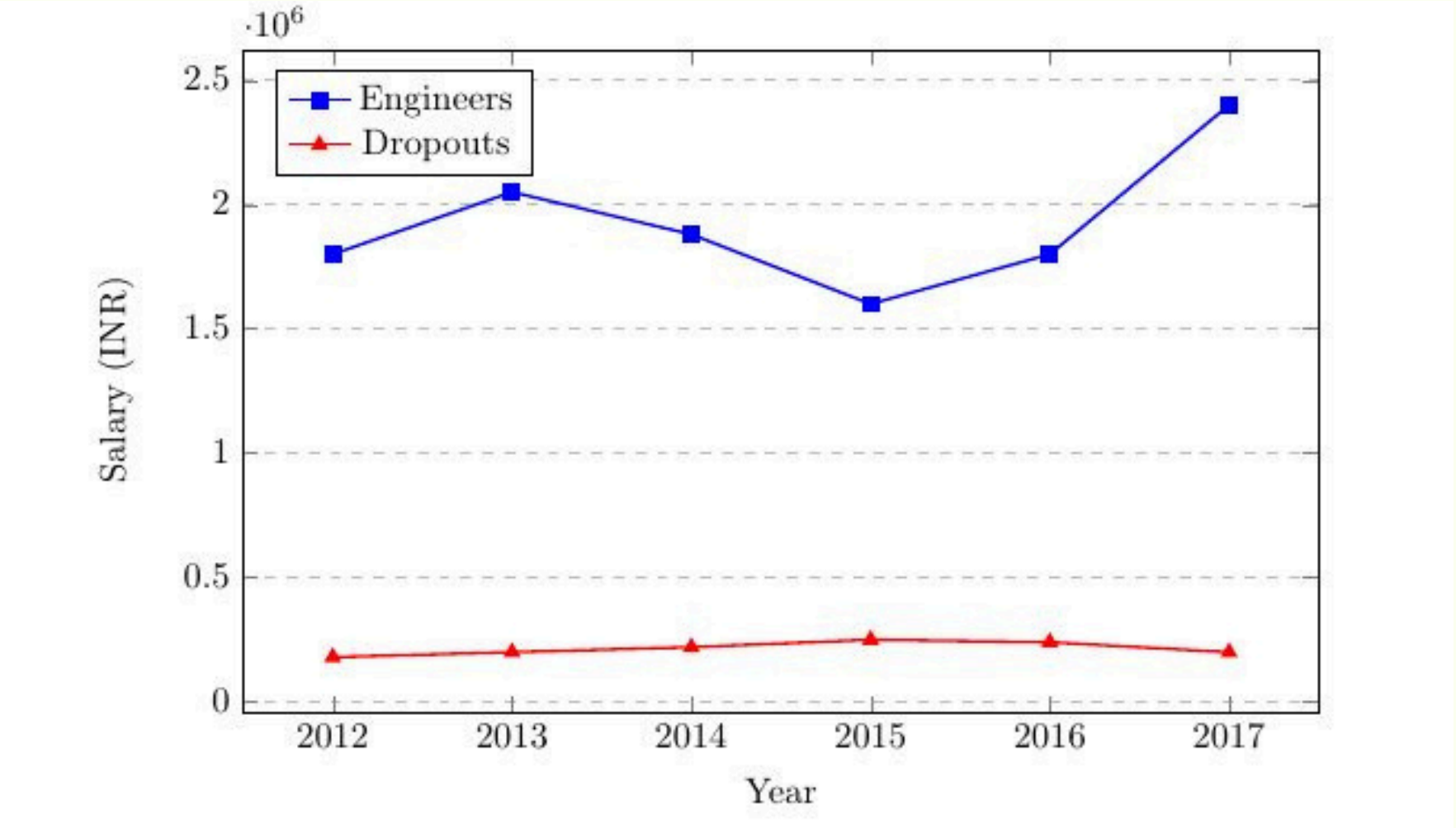


Unexpected Finding

- Parental Involvement: 22% dropouts linked to non-cooperation; home visits + counseling improved retention.

Results

Salary Comparison of Beneficiaries Vs. Drop-outs



Implications

- Policy: Scale NGO-school partnerships (NEP 2020).

Limitations

- Sample bias (high-aptitude students).
- Self-reported ERI data.

Future Research

- Test Digital and AI educational support for low income household students.
- Track alumni career outcomes (10+ years).

Thank You

Questions & Answers

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