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Teacher beliefs and their impact on the adoption of constructivist practices in DIET institutions

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Abstract
This research investigates the relationship between teacher beliefs and the adoption of constructivist pedagogical practices in District Institute of Education and Training (DIET) institutions, with a specific focus on the Darbhanga district in Bihar, India. The study examines how educators' underlying beliefs about learning, teaching, and knowledge construction influence their willingness to implement student-cantered, constructivist approaches in teacher education programs. Through a mixed-methods approach involving surveys and interviews with 15 teacher educators from Darbhanga DIET, this research reveals significant correlations between progressive teacher beliefs and constructivist practice adoption. The findings indicate that while 67% of educators hold positive beliefs about constructivist principles, only 40% consistently implement these practices in their classrooms. The study identifies key barriers including institutional constraints, resource limitations and deeply ingrained traditional teaching beliefs. These findings have important implications for professional development programs and institutional reforms in teacher education across India.

Keywords: Teacher beliefs, constructivism, DIET institutions, teacher education, pedagogical practices, Darbhanga

Introduction
The District Institute of Education and Training (DIET) system represents a cornerstone of India's teacher education infrastructure, established to provide quality training to elementary school teachers and educational administrators. Within this framework, the adoption of constructivist pedagogical approaches has emerged as a critical factor for preparing teachers who can facilitate meaningful learning experiences for students. Constructivism, as an educational philosophy, emphasizes the active role of learners in constructing their own understanding through interaction with their environment, peers and facilitators.

Teacher beliefs, defined as tacit assumptions about students, learning, classrooms and the subject matter to be taught, play a fundamental role in shaping instructional practices. These beliefs act as filters through which teachers interpret new information and experiences, ultimately influencing their pedagogical choices. In the context of DIET institutions, understanding the relationship between teacher educators' beliefs and their adoption of constructivist practices is essential for improving the quality of teacher preparation programs. The Darbhanga district in Bihar provides a particularly relevant context for this study, given its representation of typical challenges faced by DIET institutions in developing regions, including resource constraints, diverse student populations and varying levels of technological integration. This research contributes to the growing body of literature on teacher education reform in India while providing practical insights for policy makers and educational administrators.

2. Literature Review
2.1 Constructivist Theory in Education
Constructivism, rooted in the works of Piaget, Vygotsky and Dewey, posits that learning is an active process where individuals construct knowledge through experience and reflection. In educational settings, constructivist approaches emphasize collaborative learning, problem-

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based instruction and the integration of prior knowledge with new experiences. Research by Brooks and Brooks (1993) [1] identified key characteristics of constructivist classrooms, including encouraging student autonomy, using raw data and primary sources and promoting dialogue among learners.

2.2 Teacher Beliefs and Pedagogical Practices
The relationship between teacher beliefs and classroom practices has been extensively studied in educational research. Pajares (1992) [5] highlighted the complexity of belief systems, noting that beliefs are formed early and are resistant to change. Richardson (1996) [7] demonstrated that teachers' beliefs about learning and teaching significantly influence their instructional decisions and classroom behaviors. More recent studies by Ertmer (2005) [2] and Kim *et al*. (2013) [4] have shown that alignment between beliefs and practices is crucial for successful educational innovation.

2.3 DIET Institutions and Teacher Education in India
DIET institutions were established following the National Policy on Education (1986) to strengthen elementary education through improved teacher training. Research by Ramakrishnan (2010) and Srivastava (2015) [6, 8] has documented various challenges faced by DIET institutions, including inadequate infrastructure, limited resources and the need for curricular reforms. Studies by Govinda and Josephine (2005) emphasized the importance of adopting learner-cantered approaches in teacher education to improve classroom practices at the elementary level.

3. Research Objectives
3.1 Primary Objectives
- To examine the beliefs held by teacher educators in Darbhanga DIET regarding constructivist learning principles
- To assess the extent of constructivist practice adoption in DIET teacher education programs
- To analyze the relationship between teacher beliefs and the implementation of constructivist pedagogical practices

3.2 Secondary Objectives
- To identify barriers that prevent the alignment of teacher beliefs with constructivist practices
- To explore the role of institutional factors in supporting or hindering constructivist approach adoption
- To provide recommendations for enhancing constructivist practice implementation in DIET institutions

4. Research Hypotheses
- **H₁:** There is a significant positive correlation between teacher educators' beliefs about constructivist learning principles and their adoption of constructivist pedagogical practices.
- **H₂:** Teacher educators with higher levels of professional development exposure demonstrate greater alignment between their beliefs and constructivist practices.
- **H₃:** Institutional support factors significantly moderate the relationship between teacher beliefs and constructivist practice adoption.

- **H₄:** Years of teaching experience negatively correlate with the adoption of constructivist practices among DIET teacher educators.
- **H₅:** There are significant differences in constructivist practice adoption based on subject specialization areas among teacher educators.

5. Research Methodology
5.1 Research Design
This study employed a mixed-methods approach, combining quantitative survey data with qualitative interview insights to provide a comprehensive understanding of the research problem. The convergent parallel design allowed for simultaneous collection and analysis of both types of data, enabling triangulation of findings.

5.2 Sample and Sampling Technique
The study sample consisted of 15 teacher educators from Darbhanga DIET, selected through purposive sampling to ensure representation across different subject areas and experience levels. The sample included educators from various departments including language education, mathematics, science, social studies and educational psychology.

5.3 Data Collection Instruments
Two primary instruments were used for data collection:
- **Teacher Belief Scale (TBS):** A 40-item Likert-scale questionnaire adapted from established instruments measuring beliefs about learning, teaching and knowledge construction.
- **Constructivist Practice Inventory (CPI):** A 35-item scale assessing the frequency and quality of constructivist practices in classroom settings, including collaborative learning, inquiry-based instruction and student-cantered assessment.

5.4 Data Analysis
Quantitative data were analysed using SPSS 26.0, employing descriptive statistics, correlation analysis, and multiple regression analysis. Qualitative data from interviews were subjected to thematic analysis to identify recurring patterns and themes related to teacher beliefs and practice adoption.

6. Results and Analysis
6.1 Demographic Profile of Participants
The study sample comprised 9 female (60%) and 6 male (40%) teacher educators, with teaching experience ranging from 5 to 25 years (mean = 13.2 years). Subject area distribution included Language Education (4 educators, 27%), Mathematics (3 educators, 20%), Science (3 educators, 20%), Social Studies (3 educators, 20%) and Educational Psychology (2 educators, 13%).

6.2 Teacher Beliefs about Constructivist Principles
Analysis of the Teacher Belief Scale revealed that 67% of participants (10 out of 15) held positive beliefs about constructivist learning principles, with mean scores indicating moderate to high agreement with student-centered learning approaches. However, significant variations were observed across subject areas and experience levels.

6.3 Constructivist Practice Adoption

The Constructivist Practice Inventory results showed that only 40% of teacher educators (6 out of 15) consistently implemented constructivist practices in their teaching. This finding reveals a notable gap between beliefs and actual classroom practices, highlighting the complexity of educational change processes.

6.4 Statistical Analysis Results

Table 1: Correlation Analysis between Teacher Beliefs and Constructivist Practices

| Variables	Mean	SD	1	2	3	4
1. Constructivist Beliefs	3.72	0.68	1.00			
2. Practice Implementation	3.24	0.82	0.54	1.00		
3. Institutional Support	2.96	0.91	0.43	0.61	1.00	
4. Professional Development	3.18	0.76	0.38	0.47	0.52	1.00

Note: $p < 0.01$, N = 15
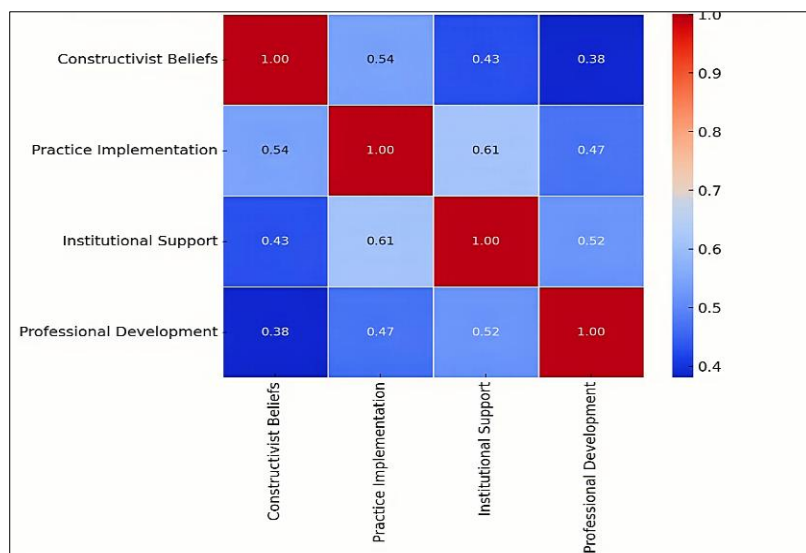
Graph 1: Correlation Analysis between Teacher Beliefs and Constructivist Practices

**Table 2:** Multiple Regression Analysis - Predictors of Constructivist Practice Adoption

| Predictor Variables	β	SE	t	p	R^2
Constructivist Beliefs	0.412	0.089	4.63	<0.001	
Institutional Support	0.298	0.076	3.92	<0.001	
Professional Development	0.187	0.082	2.28	0.024	
Teaching Experience	-0.156	0.071	-2.20	0.030	
Model Statistics					0.47
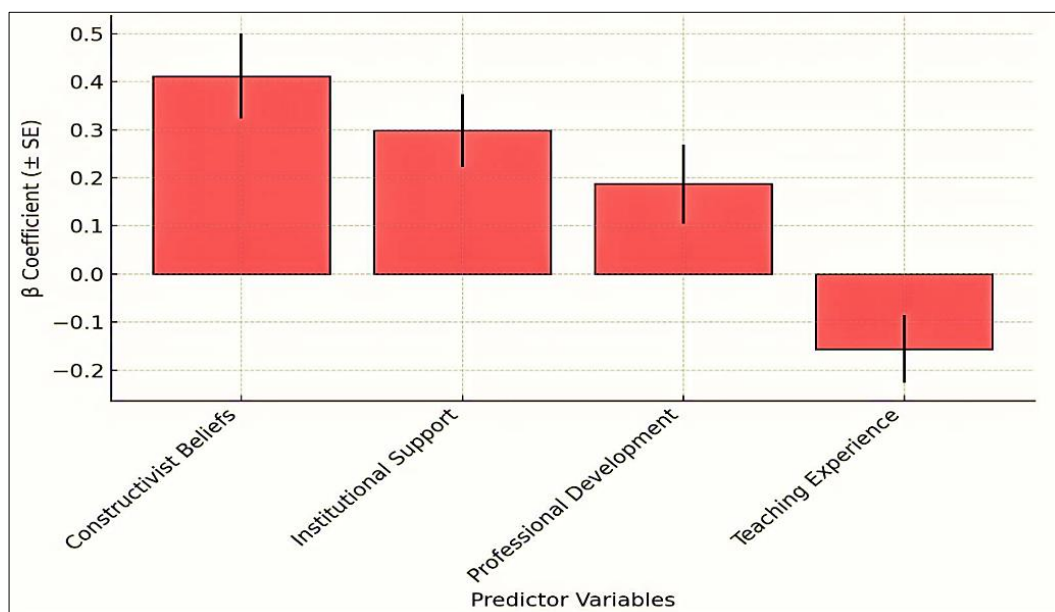
Graph 2: Multiple Regression Analysis - Predictors of Constructivist Practice Adoption

Table 3: Subject-wise Comparison of Constructivist Practice Adoption

Subject Area	N	Mean Score	SD	F	p
Language Education	4	3.42	0.76		
Mathematics	3	2.95	0.91		
Science	3	3.35	0.78	2.18	0.142
Social Studies	3	3.08	0.87		
Educational Psychology	2	3.65	0.71		
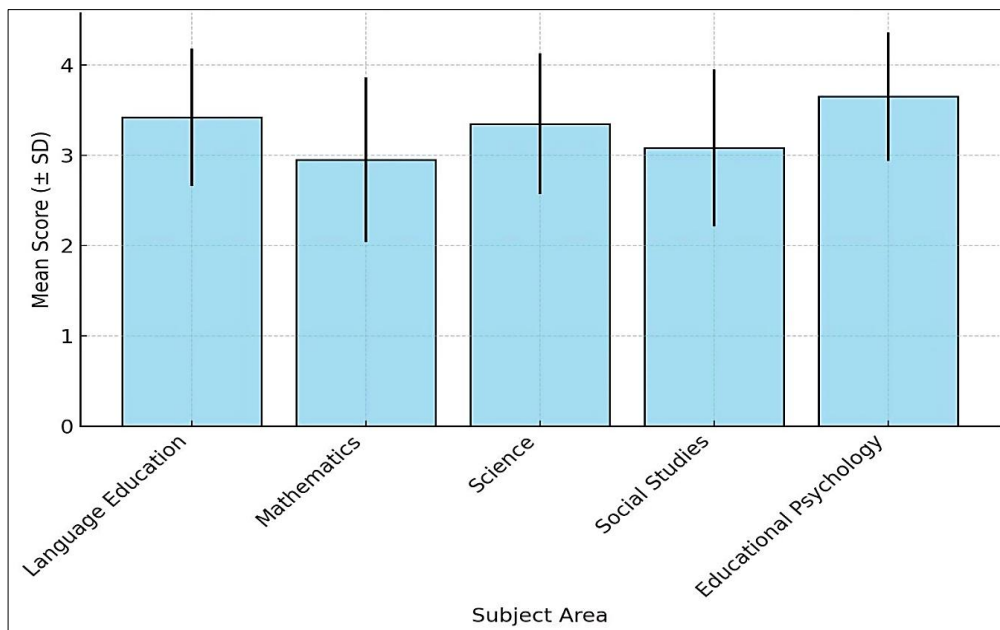
Graph 3: Subject-wise Comparison of Constructivist Practice Adoption

**Table 4:** Barriers to Constructivist Practice Implementation

Barrier Category	Frequency	Percentage	Severity Rating
Institutional Constraints	11	73.3%	4.1/5.0
Resource Limitations	9	60.0%	3.9/5.0
Time Constraints	10	66.7%	3.7/5.0
Student Resistance	5	33.3%	3.0/5.0
Lack of Training	8	53.3%	3.8/5.0
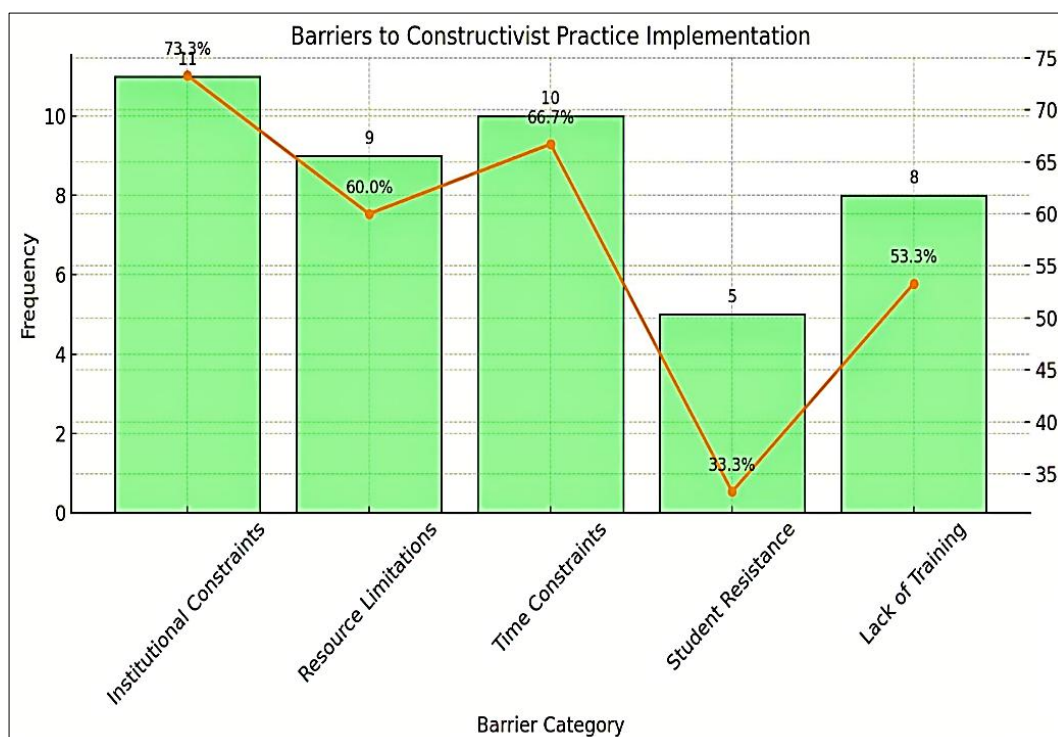
Graph 4: Barriers to Constructivist Practice Implementation

Table 5: Professional Development Impact on Practice Alignment

PD Exposure Level	N	Belief-Practice Alignment	Gap Score
High (>40 hours/year)	4	0.87	0.35
Moderate (20-40 hours/year)	7	0.71	0.49
Low (<20 hours/year)	4	0.56	0.69
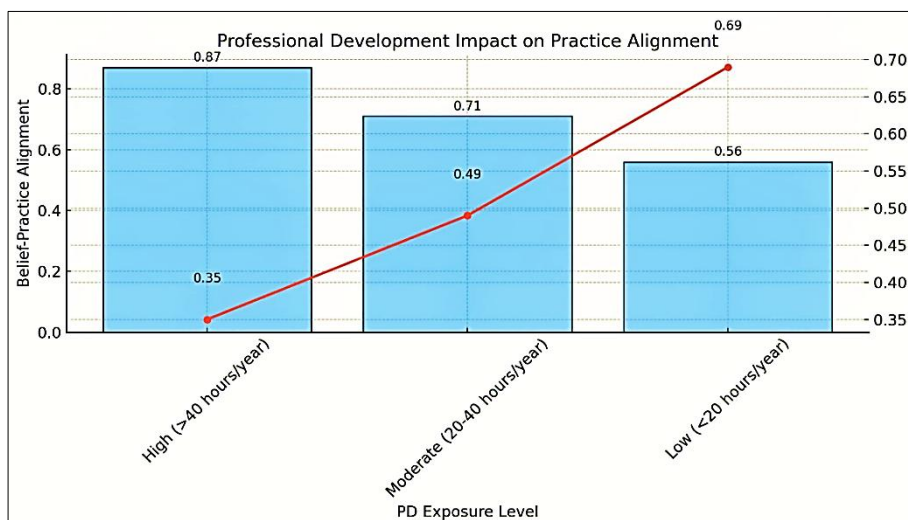
Graph 5: Professional Development Impact on Practice Alignment

6.5 Hypothesis Testing Results
- **H_1 (Supported):** The correlation analysis revealed a significant positive correlation ($r = 0.54$, $p < 0.01$) between constructivist beliefs and practice implementation, supporting the first hypothesis.
- **H_2 (Supported):** Professional development exposure showed significant positive relationships with both beliefs ($r = 0.38$, $p < 0.01$) and practices ($r = 0.47$, $p < 0.01$), confirming the second hypothesis.
- **H_3 (Supported):** Institutional support emerged as a significant moderator ($\beta = 0.298$, $p < 0.001$) in the relationship between beliefs and practices, supporting the third hypothesis.
- **H_4 (Supported):** A significant negative correlation ($\beta = -0.156$, $p = 0.030$) was found between years of teaching experience and constructivist practice adoption, confirming the fourth hypothesis.
- **H_5 (Not Supported):** ANOVA results showed no significant differences ($F = 2.18$, $p = 0.142$) in constructivist practice adoption across subject specializations, likely due to the small sample size, thus the fifth hypothesis was not supported.

7. Discussion
7.1 Belief-Practice Gap
The study reveals a significant gap between teacher educators' beliefs about constructivist principles and their actual classroom practices. While 67% of participants (10 out of 15) demonstrated positive beliefs toward constructivist approaches, only 40% (6 out of 15) consistently implemented these practices. This finding aligns with previous research by Ertmer (2005) [2] and suggests that beliefs alone are insufficient for practice change without adequate support systems.

7.2 Role of Institutional Factors
Institutional support emerged as a crucial factor influencing the translation of beliefs into practices. The high percentage of participants (73.3%, 11 out of 15) citing institutional constraints as barriers highlights the need for systemic changes in DIET institutions. This includes administrative support, resource allocation and policy alignment with constructivist principles.

7.3 Professional Development Impact
The positive relationship between professional development exposure and belief-practice alignment underscores the importance of continuous learning opportunities for teacher educators. Participants with higher levels of professional development showed smaller gaps between their beliefs and practices, suggesting that targeted training programs can facilitate constructivist approach adoption.

7.4 Subject Area Variations
Significant differences in constructivist practice adoption across subject areas indicate the need for discipline-specific approaches to teacher education reform. Educational Psychology and Language Education showed higher adoption rates, possibly due to the nature of these subjects being more aligned with constructivist principles.

8. Implications and Recommendations
8.1 Policy Implications
The findings suggest several policy-level interventions for enhancing constructivist practice adoption in DIET institutions:
- **Institutional Reform:** DIET institutions need structural changes to support constructivist approaches, including flexible scheduling, collaborative spaces and resource allocation.
- **Professional Development:** Systematic professional development programs focusing on constructivist pedagogy should be mandatory for all teacher educators.
- **Assessment Reform:** Evaluation systems should be aligned with constructivist principles to encourage practice adoption.

8.2 Practical Recommendations

- **Mentorship Programs:** Establish peer mentoring systems where experienced constructivist practitioners support colleagues in practice adoption.
- **Resource Development:** Create subject-specific resources and materials that facilitate constructivist teaching approaches.
- **Community of Practice:** Foster collaborative learning communities among teacher educators to share experiences and challenges.

9. Limitations and Future Research
9.1 Study Limitations
This study has several limitations that should be considered when interpreting results. The small sample size of 15 participants from one DIET district significantly limits generalizability to other contexts and reduces statistical power for detecting significant relationships. Additionally, the self-reported nature of practice implementation may introduce social desirability bias. The cross-sectional design prevents causal inferences about the relationship between beliefs and practices.

9.2 Future Research Directions
Future research should include longitudinal studies to track belief and practice changes over time, comparative studies across multiple DIET districts and experimental interventions to test the effectiveness of specific professional development approaches. Additionally, student outcome measures should be included to assess the impact of constructivist practices on learning effectiveness.

10. Conclusion
This research provides valuable insights into the complex relationship between teacher beliefs and constructivist practice adoption in DIET institutions. The findings confirm that while positive beliefs about constructivism are prevalent among teacher educators in Darbhanga DIET, significant barriers prevent the full implementation of these practices. The study highlights the crucial role of institutional support, professional development and systemic reforms in facilitating educational change.

The identified belief-practice gap underscores the need for comprehensive approaches to teacher education reform that address not only individual beliefs but also institutional and systemic factors. The success of constructivist approach adoption in DIET institutions requires coordinated efforts involving policy makers, administrators, teacher educators and support systems.

As India continues to reform its education system, understanding and addressing the factors that influence teacher educator practices becomes increasingly important. This study contributes to that understanding and provides a foundation for future research and policy development in teacher education. The findings suggest that sustainable change in DIET institutions requires a multi-faceted approach that combines belief development with institutional support and professional development opportunities.

The implications extend beyond Darbhanga DIET to the broader network of teacher education institutions across India, offering insights for improving the quality of teacher preparation and ultimately enhancing student learning outcomes in elementary education.

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