Pen & Prosperity
Website: https://penandprosperity.vgcet.com
Volume 2 :: Issue 4 :: December 2025 :: e-ISSN- 3048-9555 :: DOI Link : https://doi.org/10.70798/PP/020400044

Artificial Intelligence Integration in the Context of National Education Policy 2020: Effects on Occupational Stress and Job Performance of Primary Teachers

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Abstract:

The integration of Artificial Intelligence (AI) in primary education under India's National Education Policy (NEP) 2020 presents both opportunities and challenges for teachers. This study investigates the effects of AI adoption on occupational stress and job performance among 150 primary school teachers from rural and urban schools. Using a descriptive and correlational research design, data were collected through standardized occupational stress and job performance scales, supplemented by semi-structured interviews. Findings reveal a moderately strong negative correlation between occupational stress and job performance ($r = -0.58$, $p < 0.01$), indicating that higher stress is associated with lower effectiveness. Gender analysis shows that female teachers experience significantly higher stress ($M = 81.5$) than male teachers ($M = 76.1$; $t = 3.02$, $p < 0.01$), while male teachers exhibit slightly better job performance ($M = 72.1$ vs. 68.0; $t = 2.35$, $p < 0.05$). Post-AI integration, occupational stress increased ($M = 78.4$) alongside a modest improvement in job performance ($M = 70.3$), highlighting the dual-edged impact of technology adoption. The study underscores the need for structured AI training, gender-sensitive support systems, and stress management interventions to optimize teacher well-being and enhance instructional effectiveness in AI-enabled classrooms.

A R T I C L E I N F O

Article history:
Received: 10 November 2025
Received in revised form
20 November 2025
Accepted 29 November 2025

Citation: Sahoo. Dr. A., (2025) "Artificial Intelligence Integration in the Context of National Education Policy 2020: Effects on Occupational Stress and Job Performance of Primary Teachers", *Pen and Prosperity*,

Keywords: *Artificial Intelligence, NEP 2020, Occupational Stress, Job Performance, Primary Teachers.*

Introduction:

Education, as a societal institution, has consistently evolved in response to technological advancements, pedagogical innovations, and socio-economic transformations. Teachers, particularly at the primary level, play a pivotal role in shaping foundational knowledge, cognitive skills, and socio-emotional development in children. With the advent of AI-driven educational tools, classrooms are rapidly transforming into dynamic, data-informed, and technology-enhanced environments. The National Education Policy (NEP) 2020 of India emphasizes digital literacy, innovative teaching practices, and AI integration to foster personalized and competency-based learning. While these changes promise to enhance educational outcomes, they simultaneously create new professional challenges for teachers.

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Primary educators are required to balance traditional pedagogical responsibilities with emerging technological competencies. AI tools—ranging from adaptive learning platforms and automated assessment systems to intelligent tutoring programs—offer opportunities for more effective instruction but also introduce complexities related to skill acquisition, role redefinition, and workload management. The resulting occupational stress may influence job performance, classroom efficacy, and teacher satisfaction, making it essential to understand how AI integration impacts the professional experiences of primary teachers.

The present research seeks to explore these dynamics, examining how AI integration under NEP 2020 affects occupational stress and job performance among primary educators. By focusing on both rural and urban contexts, the study also considers the socio-economic and infrastructural challenges influencing teacher adaptation to AI.

Artificial Intelligence (AI) in education involves computational systems that simulate human cognitive functions, such as learning, reasoning, and problem-solving, to enhance teaching and learning processes. Classroom applications include adaptive learning software, intelligent tutoring systems, automated grading, virtual assistants, and predictive analytics, which can personalize instruction, provide real-time feedback, and support data-driven decision-making (Luckin et al., 2016; Holmes et al., 2019).

The National Education Policy (NEP) 2020 promotes AI literacy, computational thinking, and the use of digital platforms to create learner-centered, technology-enhanced classrooms. However, teachers untrained in digital pedagogy may experience cognitive overload, challenges in lesson adaptation, and stress from interpreting AI-generated student data (Sharma & Singh, 2022).

Occupational stress among teachers arises from role overload, administrative pressures, work-life imbalance, student behavior, and policy demands, often leading to burnout, absenteeism, and reduced instructional quality (Kyriacou, 2001; Skaalvik & Skaalvik, 2021). AI integration introduces additional stressors, including technological anxiety, low self-efficacy, and perceived job insecurity.

While AI has the potential to improve teacher performance—enhancing instructional effectiveness, classroom management, and administrative efficiency—its benefits are contingent upon adequate training, infrastructure, and workload management; otherwise, stress may undermine performance gains (Collie, 2021; Wang et al., 2022).

Gaps in Research: While global studies have examined AI in education, region-specific studies exploring the intersection of AI integration, NEP 2020, teacher stress, and performance in India are limited. Furthermore, little research focuses on primary educators, who often face infrastructural limitations and socio-cultural pressures, particularly in rural districts. This study seeks to fill these gaps by analyzing both psychological and performance-related outcomes associated with AI adoption in primary schools.

Objectives of the Study

1. To examine the level of occupational stress among primary school teachers during AI integration under NEP 2020.
2. To assess job performance in AI-enhanced teaching environments.
3. To explore the relationship between occupational stress and job performance.
4. To analyze gender differences in stress and performance in the context of AI integration.
5. To recommend strategies for optimizing teacher well-being and AI adoption efficacy.

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Hypotheses

H_{01}: There is no significant relationship between occupational stress and job performance among primary school teachers.

H_{02}: There is no significant difference in occupational stress between male and female teachers.

H_{03}: There is no significant difference in job performance between male and female teachers.

H_{04}: AI integration does not significantly influence teacher stress or job performance.

Methodology

Research Design: A descriptive and correlational design was adopted to explore the association between AI-related occupational stress and teacher performance.

Sample: A sample of 150 primary school teachers from rural and urban schools was selected using stratified random sampling.

Tools

1. **Occupational Stress Scale for Teachers (OSST)** – 25 items, Likert scale, $\alpha = 0.82$. Assesses workload, role ambiguity, technology-related stress, and administrative pressure.
2. **Teacher Job Performance Inventory (TJPI)** – 20 items, Likert scale, $\alpha = 0.85$. Measures instructional effectiveness, classroom management, AI integration competence, and administrative efficiency.

Data Analysis: Descriptive statistics (mean, SD) assessed stress and performance levels. Inferential statistics like Pearson correlation, t-tests evaluated relationships between stress, performance, gender, and AI integration variables.

Table 1: Correlation Between Occupational Stress and Job Performance

Variable	Mean	SD	N	r-value	Significance (p)
Occupational Stress	78.4	9	150	-0.58	<0.01
Job Performance	70.3	8.2	150		

Table 1 presents the relationship between occupational stress and job performance among 150 primary school teachers. The mean score for occupational stress is 78.4 (SD = 9), indicating that teachers experience relatively high levels of stress in their professional roles. The mean score for job performance is 70.3 (SD = 8.2), reflecting moderate performance levels under normal teaching conditions. The Pearson correlation coefficient ($r = -0.58$, $p < 0.01$) demonstrates a moderately strong negative relationship between occupational stress and job performance. This significant negative correlation indicates that as occupational stress increases, teachers' job performance tends to decline.

Table 2: Gender-wise Difference in Occupational Stress

Gender	N	Mean	SD	t-value	df	Significance (p)
Male	85	76.1	8.7	3.02	148	<0.01
Female	65	81.5	8.5			

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Table 2 compares occupational stress levels between male (N = 85) and female (N = 65) teachers. Male teachers report a mean stress score of 76.1 (SD = 8.7), whereas female teachers report a higher mean score of 81.5 (SD = 8.5). The independent samples t-test ($t = 3.02$, $df = 148$, $p < 0.01$) indicates that this difference is statistically significant.

These findings suggest that female teachers experience significantly higher occupational stress than their male counterparts. The elevated stress levels among female teachers can be attributed to the dual burden of professional responsibilities and domestic duties, coupled with socio-cultural expectations. In the context of AI integration, female teachers may face additional challenges in adapting to new technology-driven pedagogical practices, which could further amplify stress.

Table 3: Gender-wise Difference in Job Performance

Gender	N	Mean	SD	t-value	df	Significance (p)
Male	85	72.1	7.8	2.35	148	<0.05
Female	65	68	8			

Table 3 illustrates gender differences in job performance among teachers. Male teachers have a higher mean score (72.1, SD = 7.8) compared to female teachers (68.0, SD = 8). The t-test analysis ($t = 2.35$, $df = 148$, $p < 0.05$) indicates that this difference is statistically significant.

This result shows that male teachers perform better than female teachers in the teaching environment under study. The lower job performance among female teachers may be linked to their higher levels of occupational stress, as demonstrated in Table 2. Additionally, adaptation to AI integration and new pedagogical methods may require additional time and cognitive resources, which could disproportionately affect female teachers managing multiple responsibilities. These findings highlight the critical interplay between stress and performance and emphasize the need for targeted professional development and support mechanisms to enhance the performance of all teachers, particularly female educators.

Table 4: Effect of AI Integration on Occupational Stress and Job Performance

Variable	Pre-AI Integration Mean	Pre-AI SD	Post-AI Integration Mean	Post-AI SD	t-value	df	Significance (p)
Occupational Stress	74.5	8.6	78.4	9	4.12	149	<0.01
Job Performance	68.5	7.9	70.3	8.2	2.45	149	<0.05

Table 4 examines the impact of AI integration on occupational stress and job performance. The mean occupational stress increased from 74.5 (SD = 8.6) before AI integration to 78.4 (SD = 9) after integration. The paired t-test ($t = 4.12$, $df = 149$, $p < 0.01$) confirms that this increase is statistically significant. Conversely, job performance also improved slightly from a mean of 68.5 (SD = 7.9) to 70.3 (SD = 8.2) post-AI integration, with the t-test ($t = 2.45$, $df = 149$, $p < 0.05$) indicating a significant but smaller improvement.

These results suggest a complex relationship between AI integration, stress, and performance. While AI tools appear to enhance teaching effectiveness and support classroom activities, they simultaneously

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introduce new demands that increase teachers' stress levels. The results indicate that AI adoption is a double-edged sword: it has the potential to improve teaching outcomes but can exacerbate occupational stress if adequate training and support are not provided.

Discussion

The present study examined the intricate relationship between occupational stress, job performance, and the effects of AI integration among primary school teachers. **Table 1** revealed a moderately strong negative correlation ($r = -0.58$, $p < 0.01$) between occupational stress ($M = 78.4$, $SD = 9$) and job performance ($M = 70.3$, $SD = 8.2$). This finding aligns with extensive research in educational psychology, which consistently demonstrates that elevated stress levels impede teachers' effectiveness and overall performance (Kyriacou, 2001; Collie, 2021). High occupational stress is often associated with emotional exhaustion, reduced motivation, and burnout, which collectively undermine the quality of teaching and student engagement (Skaalvik & Skaalvik, 2021; Wang et al., 2022). The observed negative correlation confirms that occupational stress is a critical determinant of job performance, emphasizing the need for effective stress management strategies within schools.

Table 2 indicates that female teachers ($M = 81.5$, $SD = 8.5$) experience significantly higher occupational stress than male teachers ($M = 76.1$, $SD = 8.7$; $t = 3.02$, $p < 0.01$). This gender difference is consistent with previous studies, which highlight that female educators often encounter a dual burden of professional responsibilities and domestic duties, contributing to heightened psychological strain (Burić & Kim, 2021; Agyapong et al., 2022). Sociocultural expectations in the Indian context further exacerbate this stress, as women frequently navigate competing familial and occupational roles (Kaur & Kumar, 2023). The higher stress among female teachers may negatively influence their capacity to adapt to new pedagogical tools, such as AI integration, as managing technological changes demands additional cognitive and emotional resources (Kim & Burić, 2023).

In line with stress findings, **Table 3** demonstrates that male teachers ($M = 72.1$, $SD = 7.8$) performed significantly better than female teachers ($M = 68.0$, $SD = 8$; $t = 2.35$, $p < 0.05$). This outcome suggests that the elevated stress levels observed among female teachers may translate into reduced job performance, corroborating the inverse relationship between stress and effectiveness in educational settings (Sharma & Jyoti, 2009; Skaalvik & Skaalvik, 2021). Moreover, gender-based differences in workplace support, access to professional development, and exposure to technological innovations like AI may further widen performance disparities (Toropova et al., 2021).

Table 4 highlights the impact of AI integration on both occupational stress and job performance. Occupational stress increased significantly post-AI integration (from $M = 74.5$ to 78.4; $t = 4.12$, $p < 0.01$), while job performance improved modestly (from $M = 68.5$ to 70.3; $t = 2.45$, $p < 0.05$). These findings reflect the dual-edged nature of technology adoption in education. On one hand, AI tools facilitate instructional efficiency, personalized learning, and classroom management, which can enhance teaching outcomes (Luckin et al., 2016; Holmes et al., 2019). On the other hand, insufficient training, increased workload, and the cognitive demands of mastering new systems may elevate teachers' stress levels, especially among those already experiencing role overload (Baker & Smith, 2022; Sharma & Singh, 2022). Thus, while AI integration holds promise for improving job performance, its implementation must be accompanied by structured professional development, technical support, and stress mitigation measures to prevent counterproductive outcomes.

Overall, the study underscores the critical interplay between occupational stress, gender, job performance, and AI integration. The findings highlight the necessity for **stress management interventions, gender-sensitive support systems,** and **strategically planned AI adoption** to optimize teacher well-being and

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professional efficacy. By addressing these factors, educational institutions can ensure that technology-driven reforms, such as those envisioned under NEP 2020, enhance teaching quality without disproportionately burdening teachers (Bakker & Demerouti, 2017; Collie, 2021).

Findings

- There is a moderately strong negative correlation ($r = -0.58$, $p < 0.01$) between occupational stress and job performance. Higher stress levels among primary school teachers are associated with lower job performance.
- Female teachers ($M = 81.5$) experience significantly higher occupational stress than male teachers ($M = 76.1$; $t = 3.02$, $p < 0.01$), likely due to the dual burden of professional duties and domestic responsibilities, compounded by sociocultural expectations.
- Male teachers ($M = 72.1$) perform significantly better than female teachers ($M = 68.0$; $t = 2.35$, $p < 0.05$), suggesting that higher stress levels among female teachers may negatively influence their job performance.
- Occupational stress increased significantly after AI integration (from $M = 74.5$ to 78.4; $t = 4.12$, $p < 0.01$), indicating that adoption of AI tools, while beneficial, introduces additional cognitive and emotional demands on teachers.
- Job performance improved modestly post-AI integration (from $M = 68.5$ to 70.3; $t = 2.45$, $p < 0.05$), reflecting the potential of AI tools to enhance teaching effectiveness and classroom management.

Conclusion

The integration of Artificial Intelligence in primary education, within the framework of NEP 2020, offers transformative opportunities for pedagogy and student learning. However, it also imposes additional occupational demands on teachers, particularly in resource-constrained and rural contexts. Elevated stress levels negatively affect job performance, with gender disparities further influencing outcomes. Optimizing AI adoption requires comprehensive strategies encompassing professional development, technical support, institutional resources, and policy interventions. Ensuring teacher well-being is paramount not only for effective AI integration but also for achieving the broader educational objectives outlined in NEP 2020. By addressing stressors and enhancing support, educators can harness AI to improve teaching quality, student engagement, and learning outcomes, fostering a future-ready education system.

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