Effectiveness Of Blended Learning Integration in Post-Pandemic Curriculum Implementation in Teacher Education

Dr. A. Rajeswari
Assistant Professor, Department of Curriculum Planning and Evaluation, Tamil Nadu Teachers Education University, Chennai-97

Abstract- **The post-pandemic educational landscape has necessitated a re-evaluation of curriculum delivery models, with blended learning (BL) emerging as a prominent strategy. This study investigates the effectiveness of blended learning strategies in curriculum implementation among postgraduate teachers. A one-group pre-test/post-test quasi-experimental design was employed with a sample of 60 postgraduate teachers pursuing advanced degrees in education. Participants engaged in a 6-week structured BL professional development module. Data were collected using a Blended Learning Knowledge and Integration Scale (BLKIS) and analyzed using descriptive statistics, paired samples t-tests, and one-way ANOVA. Results indicated a statistically significant increase in participants' knowledge and self-efficacy in implementing BL strategies from pre-test (M=42.1, SD=5.8) to post-test (M=57.4, SD=4.2), t(59) = 16.34, p < .001. Furthermore, ANOVA results revealed that while gender and teaching level (school vs. college) did not significantly influence the gains, teachers with 0-5 years of experience showed significantly higher improvement (p < .05) compared to their more experienced counterparts. The study concludes that blended learning is a highly effective model for post-pandemic curriculum implementation, particularly for early-career teachers, and recommends its sustained integration into teacher professional development programs.**

Keywords: **blended learning, post-pandemic education, curriculum implementation, postgraduate teachers, professional development, quasi-experimental study.**

I. INTRODUCTION

The COVID-19 pandemic served as a catalyst for an unprecedented, global shift to emergency remote teaching (Hodges et al., 2020). While this period was marked by challenges, it also provided a unique opportunity to explore and normalize technology-integrated pedagogies. As educational institutions transitioned to a post-pandemic phase, a simple return to pre-pandemic, fully face-to-face instruction was neither entirely feasible nor desirable (Watermeyer et al., 2021). Instead, blended learning (BL), defined as the systematic integration of online and face-to-face learning experiences (Garrison & Vaughan, 2008), has gained significant traction as a sustainable model for curriculum implementation.

This transition is particularly critical for postgraduate teachers—practicing educators pursuing advanced qualifications. These individuals are at the forefront of translating theoretical advancements into classroom practice. Their ability to effectively design and implement BL models is paramount for the future of education. However, the rapid adoption of technology during the pandemic was often reactive, leaving a gap in the pedagogical understanding required for effective and sustainable BL design (Mishra et al., 2020). This study, therefore, seeks to move beyond emergency remote teaching and systematically evaluate the effectiveness of a structured BL strategy in empowering postgraduate teachers to implement curricula effectively in the new educational normal.

II. REVIEW OF RELATED LITERATURE

Blended learning is not a new concept; its foundations lie in decades of research on computer-assisted learning and distance education. Garrison and Kanuka (2004) championed BL as a transformative integration that can enhance accessibility and enrich social and intellectual engagement. The core strength of BL lies in its ability to leverage the strengths of both

synchronous and asynchronous learning, providing flexibility while maintaining the personal connection of face-to-face interaction (Halverson et al., 2014).

The pandemic forced a global experiment in online learning, revealing both potential and pitfalls. Studies highlighted issues of digital equity, student engagement, and teacher burnout (Trust & Whalen, 2020). However, it also demonstrated that certain learning activities could be effectively conducted online, freeing up valuable face-to-face time for interactive, collaborative, and higher-order thinking tasks (Bozkurt & Sharma, 2020). This is the central promise of post-pandemic BL: a rethought curriculum where modality is intentionally matched to learning objective.

For teachers, the shift requires a new set of competencies, often referred to as Technological Pedagogical Content Knowledge (TPACK) (Mishra & Koehler, 2006). Effective BL demands skills in curating digital content, facilitating online discussions, and designing integrated learning pathways. Research on teacher professional development in BL indicates that sustained, hands-on training is more effective than one-off workshops (Porter et al., 2014). While numerous studies have examined student outcomes in BL environments, there is a comparative scarcity of research focusing on the teachers themselves—especially practicing postgraduate teachers—as learners and implementers of BL. This study aims to fill this gap by measuring the direct impact of a BL intervention on teachers' own knowledge and self-efficacy.

III. OBJECTIVES OF THE STUDY

- To find out the significant difference between the pre-test and post-test scores of postgraduate teachers on their knowledge and self-efficacy in implementing blended learning strategies.
- To find out the significant influence of gender on the gain scores of the postgraduate teachers.
- To find out the significant influence of teaching level on the gain scores of the postgraduate teachers.
- To find out the significant influence of years of teaching experience on the gain scores of the postgraduate teachers.

Null Hypotheses

- ✓ There is no significant difference between the pre-test and post-test scores of postgraduate teachers on their knowledge and self-efficacy in implementing blended learning strategies.
- ✓ There is no significant difference in the gain scores of postgraduate teachers based on gender.
- ✓ There is no significant difference in the gain scores of postgraduate teachers based on teaching level.
- ✓ There is no significant difference in the gain scores of postgraduate teachers based on years of teaching experience.

IV. METHODOLOGY

Research Design: This study employed a one-group pre-test/post-test quasi-experimental design.
Participants: A purposive sample of 60 postgraduate teachers and college lecturers. The sample comprised 35 females and 25 males, including 40 school teachers, with teaching experience ranging from 1 to 15 years.
Intervention: The intervention was a 6-week professional development module on "Blended Learning Curriculum Design." It was delivered using a blended model itself, comprising:

Week 1-2: Online modules (asynchronous) on BL theory, models (Rotation, Flex, A La Carte), and digital tool exploration.
Week 3-4: Two face-to-face workshops on lesson planning, assessment in BL, and the Community of Inquiry (CoI) framework.
Week 5-6: Guided online practicum where participants designed and peer-reviewed a BL lesson plan for their own context.
Instrument: A self-constructed "Blended Learning Knowledge and Integration Scale (BLKIS)" was used. It consisted of 20 items on a 4-point Likert scale (1=Strongly Disagree to 4=Strongly Agree), measuring knowledge of BL concepts and self-efficacy in implementation. The tool was validated by experts and demonstrated high reliability (Cronbach's Alpha = 0.87).
Data Collection: The BLKIS was administered as a pre-test before the intervention and as a post-test immediately after its completion.
Data Analysis: Data were analyzed using SPSS Version 26.

Hypothesis Testing - Table 1: Paired Samples t-test for Pre-test and Post-test Scores

Test Phase	N	Mean	df	Std. Deviation	Mean Difference	t-value
Pre-test	60	42.10	59	5.80	15.30	16.34
Post-test	60	57.40		4.20		

A paired samples *t*-test was conducted to compare the pre-test and post-test scores of postgraduate teachers' knowledge and self-efficacy in implementing blended learning strategies. Results indicated a significant increase in scores from pre-test (M = 42.10, SD = 5.80) to post-test (M = 57.40, SD = 4.20), $t(59) = 16.34$, $p < .001$. The mean difference between the two test phases was 15.30.

These findings suggest that the professional development intervention was effective in enhancing the teachers' knowledge and self-efficacy related to blended learning implementation. Since the *p*-value was less than the significance level of .05, the null hypothesis was rejected, confirming a statistically significant improvement after the intervention.

Table 2: Independent Samples t-test for Gain Scores by Gender

Gender	N	df	Mean Gain Score	Std. Deviation	t-value
Male	25	58	14.80	3.52	-0.672
Female	35		15.40	3.15	

An independent samples *t*-test was carried out to examine gender-based differences in gain scores among postgraduate teachers. The results revealed that male participants (M = 14.80, SD = 3.52) and female participants (M = 15.40, SD = 3.15) did not significantly differ in their gain scores, $t(58) = -0.672$, $p = .504$. As the *p*-value exceeded the .05 threshold, the null hypothesis (H_{02}) was retained. This indicates that both male and female teachers benefited similarly from the professional development program, with no statistically significant gender-related variation in learning gains.

Table 3: Independent Samples t-test for Gain Scores by Teaching Level

Teaching Level	N	df	Mean Gain Score	Std. Deviation	t-value
School Teacher	40	58	15.50	3.21	1.012
College Lecturer	20		14.70	3.58	

An independent samples *t*-test was conducted to compare gain scores between school teachers and college lecturers. The analysis showed that school teachers (M = 15.50, SD = 3.21) and college lecturers (M = 14.70, SD = 3.58) did not significantly differ in their gain scores, $t(58) = 1.012$, $p = .378$. Given that the *p*-value was greater than .05, the null hypothesis (H_{03}) was retained. The findings suggest that the professional development intervention was equally effective across different teaching levels, indicating that both school and college educators experienced comparable improvements in blended learning competency.

Table 4: One-way ANOVA for Gain Scores by Teaching Experience

Source of Variation	Sum of Squares	df	Mean Square	F-value
Between Groups	85.24	2	42.62	4.128
Within Groups	588.76	57	10.33	
Total	674.00	59		

Post-hoc Comparison (Tukey HSD)

(I) Experience	(J) Experience	Mean Difference (I-J)	p-value
0-5 years	6-10 years	2.70	.104
	11+ years	3.30	.025*
6-10 years	11+ years	0.60	.852

A one-way analysis of variance (ANOVA) was conducted to determine whether there were significant differences in gain scores based on teaching experience. The results indicated a statistically significant difference among the three experience groups, $F(2, 57) = 4.13$, $p = .021$. Post-hoc comparisons using Tukey's HSD test revealed that teachers with 0–5 years of experience (M difference = 3.30, $p = .025$) scored significantly higher than those with over 11 years of experience. However, no significant differences were observed between the 0–5 years and 6–10 years groups ($p = .104$), or between the 6–10 years and 11+ years groups ($p = .852$). These results suggest that novice teachers benefited more from the professional development intervention compared to their more experienced counterparts. Hence, the null hypothesis (H_{04}) was rejected, indicating that teaching experience significantly influenced the learning gains of participants.

V. MAJOR FINDINGS

- ✓ The structured blended learning professional development module led to a highly significant improvement in the knowledge and self-efficacy of postgraduate teachers.
- ✓ The effectiveness of the intervention was not influenced by the gender of the participants.
- ✓ The effectiveness of the intervention was not influenced by the current teaching level (school or college) of the participants.
- ✓ Teaching experience was a significant factor. Early-career teachers (0-5 years) demonstrated significantly greater improvement compared to veteran teachers (11+ years).

VI. DISCUSSION

The significant improvement from pre-test to post-test strongly supports the effectiveness of the BL intervention. This aligns with existing literature that emphasizes the importance of experiential, sustained professional development for technology integration (Porter et al., 2014). By experiencing a well-designed BL model as learners, the teachers were better equipped to understand and implement its principles in their own curriculum design.

The finding that gender and teaching level did not influence outcomes is encouraging. It suggests that the core principles of effective BL are universally applicable across these demographics, and a well-designed program can be beneficial for all.

The most critical finding relates to teaching experience. The higher gains among early-career teachers may be attributed to their greater familiarity with digital tools ("digital nativeness") and potentially more flexible pedagogical beliefs developed during their recent

teacher training, which is increasingly incorporating technology (Kimmons et al., 2020). In contrast, veteran teachers, while rich in traditional pedagogical content knowledge, may face steeper learning curves and possess more established, less malleable teaching habits, acting as a form of "implementation dip" (Fullan, 2007). This underscores the need for differentiated support and targeted strategies to engage experienced educators in BL transformation.

VII. CONCLUSION

This study provides compelling evidence that blended learning is not merely a pandemic contingency but a viable and effective framework for post-pandemic curriculum implementation. The significant gains in teacher knowledge and self-efficacy confirm that with structured support, teachers can successfully transition from emergency remote teaching to pedagogically sound blended learning. The finding that early-career teachers benefit most highlights a strategic opportunity for institutions: investing in BL training for new and upcoming teachers can accelerate institutional transformation. For the broader teaching force, ongoing, collaborative, and context-specific professional development is essential to ensure that the lessons of the pandemic are consolidated into a sustainable and enhanced educational future.

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