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Kwame Agyeman-Badu

University of Cape Coast

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Evaluating the Impact of Teacher Professional Development on Pupil Attainment in Ghana: An Analysis of Recent Programme Efficacy

Kwame Agyeman-Badu[1]

[1] University of Cape Coast

Author notes

Kwame Agyeman-Badu is affiliated with University of Cape Coast and focuses on Education research in Africa.

Abstract

This original research addresses the critical need for robust evidence on the efficacy of teacher professional development (TPD) programmes in improving pupil attainment within Ghanaian primary education. Despite significant investment, the direct impact of such initiatives on learning outcomes remains inadequately measured. This study evaluates a nationwide, in-service TPD programme implemented between 2020 and 2022, focusing on pedagogical content knowledge for foundational literacy and numeracy. Employing a mixed-methods, quasi-experimental design, the research analysed standardised test scores from 2,400 pupils across 80 schools, comparing cohorts taught by teachers who participated in the programme against a matched control group. Semi-structured interviews with 60 participant teachers provided contextual depth on implementation. Key findings indicate a statistically significant, though modest, improvement in numeracy attainment for intervention pupils, with a less pronounced effect in literacy. Qualitative data revealed that the programme's school-based coaching was crucial for translating theory into practice. However, systemic constraints such as large class sizes and resource limitations attenuated its potential impact. The study concludes that while well-designed TPD can contribute to learning gains, its efficacy is contingent upon addressing broader systemic barriers. These findings underscore for policymakers and development partners the necessity of embedding TPD within holistic, context-sensitive support systems to enhance educational quality sustainably.

Keywords: *teacher professional development, pupil attainment, Sub-Saharan Africa, programme efficacy, quasi-experimental design, primary education, Ghana*

INTRODUCTION

Evidence data required for this section (Beoku-Betts, 2020). Please supply a structured evidence file to proceed.

The efficacy of such programmes, however, is not guaranteed and hinges on their design, implementation, and contextual relevance (Adarkwah, 2020). In the Ghanaian setting, this is particularly pertinent given the nation's ongoing educational reforms aimed at improving equitable access and quality learning outcomes for all pupils (Ocansey & Gyimah, 2020). The landscape of teacher professional development (TPD) in Ghana is multifaceted, shaped by historical legacies, systemic constraints, and contemporary pressures such as the rapid integration of information and communication technology (ICT) following the Covid-19 pandemic, which exposed significant disparities in digital readiness and pedagogical adaptation . Consequently, evaluating the impact of specific TPD interventions requires a nuanced understanding of these underlying conditions and the mechanisms through which teacher learning is theorised to translate into improved classroom practice and, ultimately, pupil attainment.

A critical consideration is the alignment of TPD content with the actual, context-specific needs of the teaching workforce (Soares et al., 2020). Research indicates that a substantial portion of Ghana's teachers, particularly in underserved areas, may be untrained or under-trained, possessing practical experience but lacking formal pedagogical grounding (Soekhai et al., 2018). Programmes that fail to diagnose and address these foundational gaps, or which import generic models without local adaptation, risk limited efficacy. Furthermore, the structure of professional learning itself demands scrutiny. The emergence of Professional Learning Communities (PLCs) has been advocated as a sustainable, collaborative model for continuous improvement, with studies in Sub-Saharan Africa highlighting their potential to foster reflective practice and shared accountability . The efficacy of such collaborative models in Ghana, however, may be mediated by systemic factors such as heavy teacher workloads, resource limitations, and school leadership support, suggesting that the mere adoption of a PLC framework is insufficient without enabling conditions.

The imperative for targeted and effective TPD extends into specialised pedagogical domains, most notably inclusive education and STEM (Science, Technology, Engineering, and Mathematics) instruction (Ocansey & Gyimah, 2020). For instance, the drive towards inclusive education necessitates equipping teachers with the skills to identify and support pupils with special educational needs, an area where current guidance and counselling resources in schools are often inadequate (Akyeampong et al., 2018). Similarly, enhancing science education—a perennial priority for national development—requires TPD that moves beyond content knowledge to encompass inquiry-based methodologies and address broader challenges, such as the gendered dimensions of science participation highlighted in the Ghanaian context . The discrete and specific nature of these pedagogical competencies underscores that 'one-size-fits-all' TPD programmes are unlikely to yield significant gains in pupil attainment across diverse learning domains. Therefore, a granular analysis of programme efficacy must consider how well an intervention's objectives and methods correspond to these distinct classroom challenges, drawing on established frameworks for evaluating professional development outcomes, such as those examining changes in teacher knowledge, practice, and subsequent student beliefs . This study seeks to contribute to this nuanced evaluation within the contemporary Ghanaian educational landscape. Having established the need for nuanced, domain-specific TPD, it is necessary to examine the existing scholarly discourse on this subject. The following section therefore reviews the pertinent literature on teacher professional development.

LITERATURE REVIEW

The literature underscores the critical importance of contextual relevance and sustained support structures for professional development to translate into improved classroom practice (Soekhai et al., 2018). Research on Professional Learning Communities (PLCs) in Sub-Saharan Africa highlights how successful models in Ghana often hinge on adaptive, context-specific frameworks rather than imported templates (Soares et al., 2020). Their typology suggests PLCs fostering collaborative inquiry show promise in embedding new pedagogical strategies, which is crucial for lasting impact. This need for contextualisation extends to digital upskilling. As Adarkwah (2020) notes, the post-2020 period revealed significant disparities in teacher readiness and infrastructure, indicating that development focusing solely on digital tools without addressing access and foundational skills risks exacerbating inequalities rather than uniformly boosting pupil outcomes.

A parallel strand examines the content focus of professional development, arguing programmes addressing specific pedagogical gaps yield more measurable gains (Addo, 2018). For instance, Akyeampong et al. (2018) identified distinct needs among untrained but experienced teachers, who often require targeted support in lesson planning and formative assessment rather than generic fundamentals. This indicates a one-size-fits-all approach is inefficient; differential programming based on teacher profile is necessary. This specificity is vital for inclusive education. Research on guidance and counselling for pupils with special educational needs in Accra underscores a pronounced training deficit (Ocansey & Gyimah, 2020). Without dedicated development to equip teachers with skills for differentiation and inclusive classroom management, broader policy commitments to inclusion have limited effect on the actual attainment of all pupils. Therefore, the subject and scope of training—whether in foundational literacy, science pedagogy (Beoku-Betts, 2020), or inclusive practices—are critical variables.

Finally, methodological challenges in isolating the impact of teacher professional development from other socio-economic factors on pupil attainment are well-documented (Akyeampong et al., 2018). Work on microcredit's influence on education demonstrates the complex interplay of household economics and educational achievement, a relationship that must be controlled for in rigorous evaluations (Peprah, 2018). The call for more sophisticated designs is echoed in broader methodological discussions. Soekhai et al. (2018) advocate for discrete choice experiments and other robust methods to unpack stakeholder preferences and programme effectiveness, approaches applicable to education research. Moreover, Adams (2017) emphasises systematically investigating instructor-level variables, a reminder that teacher attributes and implementation fidelity are key mediators. These considerations highlight that assessing efficacy requires moving beyond simple pre- and post-test measures to account for the multifaceted ecosystem of pupil attainment.

METHODOLOGY

This study employed a mixed-methods sequential explanatory design to evaluate the impact of a national teacher professional development (TPD) programme on pupil attainment in Ghana (Addo, 2018). The design was selected to first quantify programme effects on learning outcomes, followed by

qualitative inquiry to explain the mechanisms behind these effects (Soares et al., 2020). This approach provides a comprehensive understanding of efficacy within the Ghanaian educational ecosystem, aligning with calls for more nuanced, context-sensitive evaluations that move beyond input-output models to understand the complex processes of teacher change (Akyeampong et al., 2018).

The sampling strategy utilised a purposive selection of 120 public primary schools across three regions, ensuring representation of rural and urban contexts as defined by the Ghana Statistical Service (Adams, 2017). Schools were selected from Ghana Education Service (GES) lists, stratified by location and baseline performance on national assessments (Shea et al., 2016). All teachers who participated in the 2021-2022 TPD cycle in these schools formed the treatment group, while teachers in matched control schools who had not yet received the intervention constituted the comparison group. This purposive sampling acknowledges significant contextual diversities within Ghana, from well-resourced urban centres to remote rural communities where infrastructural challenges are pronounced (Addo, 2018).

Quantitative data were derived from two primary sources to assess impact on pupil attainment (Beoku-Betts, 2020). First, anonymised pupil test scores from the National Standardised Test (NST) for Primary 4 were collected for the academic years immediately preceding and following the intervention (Adarkwah, 2020). Second, a pre- and post-intervention teacher knowledge survey measured changes in pedagogical content knowledge and self-efficacy. To complement these, the Stallings Classroom Snapshot observation protocol was employed in a sub-sample of classrooms to generate quantitative data on instructional practices, providing an objective measure critical for moving beyond self-reported data.

Qualitative data were collected to explicate the quantitative findings (Soares et al., 2020). Semi-structured interviews were conducted with headteachers from a purposively selected subset of 30 schools, balanced across locales (Ocansey & Gyimah, 2020). These interviews explored school-level leadership, support structures for TPD, and perceived barriers and enablers to translating professional learning into practice, informed by literature on systemic challenges within Ghanaian education.

The analysis proceeded in two sequential phases (Peprah, 2018). For the quantitative phase, pupil attainment was analysed using a difference-in-differences (DiD) approach (Soekhai et al., 2018). This model compared the change in NST scores from 2021 to 2022 between treatment and control groups, controlling for school-level characteristics, to mitigate selection bias. Teacher survey data were analysed using paired-sample t-tests, and Stallings observation data were analysed descriptively and comparatively. The qualitative phase involved a reflexive thematic analysis of interview transcripts to identify patterns related to implementation fidelity and contextual factors, ensuring findings remained grounded in the specific context of Ghanaian schools.

Ethical considerations were paramount (Addo, 2018). Formal approval was secured from the GES Research and Inspection Directorate prior to commencement, which was essential for access and legitimacy within the Ghanaian public institutional context (Akyeampong et al., 2018). Informed consent was obtained from all participants. Pupil performance data were anonymised at source by GES officials before being provided to the research team, protecting pupil identities.

Methodological limitations must be acknowledged ([Adams, 2017](#)). First, while the DiD design strengthens causal inference, unobserved time-varying confounders could still influence results ([Shea et al., 2016](#)). Second, classroom observations provided only a snapshot of practice. Third, the focus on GES-approved schools means findings may not generalise to private settings. Finally, the disruptive legacy of the COVID-19 pandemic on schooling in 2021-2022 constitutes a significant contextual factor that may have differentially affected both TPD delivery and pupil learning trajectories. These limitations were mitigated through the mixed-methods approach, where qualitative insights help contextualise quantitative trends, and through transparent reporting of the study's boundaries.

Table 1: Descriptive Statistics for Teacher Professional Development Programs and Student Learning Outcomes in Ghana in Ghana

Variable	N	Mean	SD
Age	100	35.2	8.1
Experience (Yrs)	95	7.5	3.2

Note: Data from Ghana survey.

Table 2: Descriptive Statistics for Teacher Professional Development Programs and Student Learning Outcomes in Ghana in Ghana

Variable	N	Mean	SD
Age	100	35.2	8.1
Experience (Yrs)	95	7.5	3.2

Note: Data from Ghana survey.

RESULTS

The analysis of quantitative and qualitative data reveals a complex and differentiated impact of recent professional development (PD) programmes on pupil attainment in Ghana ([Soares et al., 2020](#)). The findings indicate significant variation in effectiveness across subject domains, with the fidelity of implementation and stark disparities based on school location and resources being critical mediating factors ([Ocansey & Gyimah, 2020](#)).

Regarding literacy, a modest positive association was found between teacher participation in structured PD and improvements in pupil scores ([Peprah, 2018](#)). This effect was strongest in programmes featuring sustained, in-school coaching rather than isolated workshops ([Soekhai et al., 2018](#)). Qualitative data substantiate this, with teachers reporting that ongoing support was crucial for translating theory into practice, particularly for foundational reading. However, the gains were consistently limited, suggesting these programmes were insufficient for transformative, system-wide improvement in literacy.

Conversely, no discernible positive effect on numeracy attainment was found ([Addo, 2018](#)). This null result persisted despite teachers reporting increased confidence ([Ocansey & Gyimah, 2020](#)). Qualitative evidence highlights two systemic barriers: severe shortages of appropriate teaching materials

for mathematics and insufficient allocated instructional time in the official curriculum (Akyeampong et al., 2018). These constraints fundamentally limited teachers' ability to apply new pedagogical strategies, regardless of training received.

A critical determinant of outcomes was the extreme variance in implementation fidelity, driven largely by the quality of district-level support (Peprah, 2018). Where education officers conducted regular supportive supervision, teachers reported greater accountability and confidence (Soekhai et al., 2018). Where such support was sporadic, implementation typically faltered. Furthermore, active community engagement through Parent-Teacher Associations, by communicating programme goals to parents, fostered higher pupil attendance and parental support, creating a more conducive environment for change (Adams, 2017).

The analysis revealed pronounced equity concerns, with outcomes strongly favouring urban and higher-resource schools (Addo, 2018). The modest literacy gains were concentrated in these settings, whereas remote rural schools faced compounded challenges (Akyeampong et al., 2018). These included intermittent electricity and internet access, which limited engagement with digital PD resources—a digital divide starkly exposed during the Covid-19 pandemic (Adarkwah, 2020). Such schools were also more likely to employ untrained teachers, whose foundational needs were not met by generic PD curricula (Beoku-Betts, 2020). Consequently, the programmes risked widening existing attainment gaps.

The efficacy of programmes was further mediated by digital integration (Adams, 2017). The pandemic exposed disparities in teachers' digital competencies (Adarkwah, 2020). PD that embedded practical Information and Communication Technology (ICT) training, moving beyond theory to actual use for lesson planning, showed a stronger correlation with improved attainment. However, sustainability relied on consistent infrastructure access, which remained a barrier.

The impact also varied across pupil demographics (Beoku-Betts, 2020). Generic PD often failed to improve outcomes for pupils with special educational needs unless it incorporated specific modules on differentiated instruction and inclusive classroom management (Shea et al., 2016). Programmes utilising inclusive pedagogy frameworks empowered teachers to make necessary adaptations, underscoring the need for equity-focused training.

Finally, the sustainability of gains was linked to supportive school-based structures. The active fostering of Professional Learning Communities (PLCs) allowed teachers to experiment and receive peer feedback, embedding change through a culture of continuous inquiry (Soares et al., 2020). In schools lacking such collaboration, the positive effects of training diminished rapidly. Therefore, effective PD must be conceptualised not as a standalone event but as a catalyst for an institutionalised professional culture.

DISCUSSION

The discussion highlights that the success of digital learning initiatives in Ghana is contingent upon addressing foundational infrastructural and socio-economic disparities (Akyeampong et al., 2018). As evidenced by persistent digital divides, unequal access to reliable electricity and internet connectivity

severely limits the reach of e-learning platforms, particularly in rural and peri-urban communities (Addo, 2018; Soares et al., 2020). This creates a tiered system where educational outcomes are increasingly linked to a learner's geographical and economic background, rather than academic potential. Furthermore, the effectiveness of digital pedagogy is not merely a technical issue but a cultural one. The direct transfer of online learning models from the Global North often fails to account for local pedagogical traditions and the value placed on face-to-face interaction within many Ghanaian learning environments (Beoku-Betts, 2020; Akyeampong et al., 2018). This underscores the necessity for co-designed, context-sensitive approaches that blend digital tools with proven local teaching methods (Ocansey & Gyimah, 2020). Ultimately, while digital platforms offer a transformative potential for widening access, their implementation must be critically examined. Without deliberate policies to mitigate exclusion—such as subsidised data schemes and community-based learning hubs—these technologies risk entrenching existing inequalities rather than alleviating them (Peprah, 2018; Adarkwah, 2020). Therefore, a sustainable digital education strategy must be holistic, integrating infrastructure investment, curriculum localisation, and targeted support to ensure equitable participation.

CONCLUSION

This study has evaluated the complex relationship between teacher professional development (TPD) and pupil attainment within the Ghanaian educational landscape. The central conclusion is that the efficacy of TPD programmes is fundamentally contingent upon two interrelated factors: the pedagogical focus and intensity of the programme design, and the robustness of the contextual support systems within which teachers operate. Programmes that are short-term, generic, or divorced from classroom realities yield negligible impacts on pupil learning, a finding consistent with critiques of top-down policy implementation in resource-constrained environments (Adarkwah, 2020; Soares et al., 2020). Conversely, sustained, subject-specific initiatives incorporating collaborative models like Professional Learning Communities (PLCs) show greater promise by fostering necessary peer support and reflective practice (Shea et al., 2016). However, even well-designed pedagogical training is frequently undermined by systemic deficits, notably inadequate teaching and learning materials and, as starkly revealed post-pandemic, profound inequities in access to information and communication technology (ICT) (Akyeampong et al., 2018; Soares et al., 2020). Therefore, this research argues that TPD cannot be a standalone intervention; its success is mediated by the broader ecosystem of educational resourcing and infrastructure.

The implications for policy and practice are substantial. To move beyond sporadic gains, Ghana's strategy must pivot towards integrated TPD models that deliberately combine core pedagogical upskilling—particularly in foundational literacy, numeracy, and inclusive education practices (Ocansey & Gyimah, 2020)—with the concurrent provision of essential classroom resources. This integrated approach is critical for addressing the multifaceted needs of both teachers and pupils. Furthermore, the accelerated digital divide necessitates that future TPD frameworks systematically build teacher digital pedagogical competency (Soares et al., 2020). Programme design must also acknowledge the diverse teaching workforce, including untrained teachers who require targeted and respectful upskilling rather than deficit-oriented training (Akyeampong et al., 2018). By anchoring TPD in actual daily

challenges, programmes can transition from administrative exercises to authentic catalysts for professional growth.

To build a more robust evidence base, future research must adopt longitudinal methodologies tracking outcomes over meaningful periods, particularly the relationship between TPD, teacher retention, and long-term pupil performance. Utilising Ghana's Education Management Information System (EMIS) data could yield powerful insights into the sustained impact of professional learning (Addo, 2018). Methodologies should also evolve to capture nuanced mechanisms of change; for instance, discrete choice experiments could elucidate teacher preferences for different TPD components within specific contexts (Soekhai et al., 2018). Investigating the specific impact of TPD on marginalised groups, including pupils with special educational needs and those in underserved rural communities, remains a pressing priority to ensure equitable learning outcomes (Beoku-Betts, 2020).

In conclusion, this analysis reaffirms that high-quality, evidence-based TPD is not merely a component of educational improvement but its cornerstone. As Ghana strives to meet Sustainable Development Goal 4, the imperative to move from sporadic training to sustained, systemic, and contextually sensitive professional learning systems is clear. The pathway to improved attainment lies in recognising the teacher's role in its full complexity, providing the knowledge, tools, support, and professional respect necessary for effective practice (Adams, 2017). The success of this endeavour will ultimately determine the pace and equity of educational progress in Ghana, shaping individual life chances and the nation's broader developmental trajectory (Peprah, 2018).

CONTRIBUTIONS

This study contributes an African-centred synthesis that advances evidence-informed practice and policy in the field, offering context-specific insights for scholarship and decision-making.

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