



DEVELOPING A COST-BENEFIT ANALYSIS FRAMEWORK FOR EVALUATING TEACHER TRAINING IN NIGERIAN COLLEGES OF EDUCATION

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ABSTRACT

Teacher training is widely recognised as a major investment in improving educational quality and human capital development, yet its economic efficiency and value for money in Nigeria remains underexamined. This paper developed a Cost-Benefit Analysis (CBA) framework for evaluating teacher training programmes in Nigerian Colleges of Education through a review of relevant theoretical and empirical literature. The framework linked training costs and implementation processes to outputs, educational outcomes, and long-term economic and social benefits. It provided a systematic basis for assessing returns such as improved teacher competence, student learning, institutional effectiveness, workforce productivity, and societal development. The paper argued that viewing teacher training as an investment rather than merely recurrent expenditure could support evidence-based policy, efficient resource allocation, and accountability. It recommended empirical validation of the framework across different institutional contexts.

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INTRODUCTION

Teacher quality remains one of the most influential determinants of educational effectiveness and sustainable national development. Across the world, governments and development agencies increasingly recognize that investments in teacher education and continuous professional development are fundamental to improving learning outcomes, promoting educational equity, and strengthening human capital (Mitchell et al., 2024). As education systems respond to rapid technological change, curriculum reforms, globalization, and the demands of twenty-first-century skills, teacher training has become an essential strategy for equipping educators with the knowledge, competencies, and pedagogical skills required to deliver quality instruction.

Consequently, substantial public resources are devoted annually to pre-service preparation and continuing professional development programmes in many countries. Recent African evidence consistently demonstrates that well-designed teacher training programmes contribute to improved instructional quality, enhanced teacher confidence, greater classroom effectiveness, and better student learning outcomes (Mitchell et al., 2024). Beyond these immediate educational benefits, investments in teacher development generate broader social

and economic returns through increased workforce productivity, improved educational attainment, and long-term national economic growth. (Moussa & Kim, n.d.) FHI 360 (2026), (Cilliers et al., 2022) This paper is a conceptual study that develops a Cost-Benefits Analysis framework through the critical synthesis of existing theoretical and empirical literature rather than through the collection of primary data, these outcomes are consistent with the principles of Human Capital Theory, which argues that investment in education and skills development enhances individual productivity and contributes significantly to national development (Becker, 1993).

Similarly, the Economics of Education emphasizes that educational investments should be assessed not only in terms of educational outcomes but also in terms of efficiency, effectiveness, and value for money Despite widespread recognition of the importance of teacher training, many developing countries continue to face significant challenges in financing, implementing, and evaluating professional development programmes. Limited financial resources, competing policy priorities, inadequate monitoring systems, and weak institutional capacity often reduce the effectiveness of teacher training initiatives. These challenges are particularly evident in Sub-Saharan Africa, where governments are under increasing pressure to maximize the impact of scarce educational resources while simultaneously improving the quality of teaching and learning (Mitchell et al., 2024). As public expenditure on education continues to increase, policymakers require robust analytical tools that can determine whether investments in teacher training generate benefits that justify their financial and opportunity costs (Cilliers et al., 2021).

Nigeria presents a particularly important context for examining this issue. As Africa's most populous country, Nigeria has made considerable investments in teacher education through its Colleges of Education, which serve as the primary institutions responsible for preparing teachers for the basic education sector (NCCE, 2023) These institutions play a strategic role in achieving national educational objectives by producing qualified teachers capable of implementing curriculum reforms and improving learning outcomes. In addition to pre-service preparation, Colleges of Education regularly organize professional development programmes, workshops, seminars, curriculum implementation training, digital literacy initiatives, and other capacity-building activities aimed at improving instructional quality.

However, teacher education in Nigeria continues to experience persistent challenges that limit its effectiveness. Chronic underfunding, inadequate infrastructure, limited instructional resources, weak quality assurance mechanisms, inconsistent policy implementation, and insufficient monitoring have constrained the quality and sustainability of teacher training programs. Furthermore, although governments and educational institutions continue to allocate substantial financial resources to teacher development, decisions regarding programmed design and funding are often based on administrative priorities rather than systematic evidence regarding their economic efficiency or long-term returns.

Existing literature has extensively documented the educational benefits of teacher training,

including improvements in teachers' pedagogical knowledge, classroom management, instructional practices, professional competence, and student academic achievement. Nevertheless, most previous studies particularly within the Nigerian context have concentrated primarily on educational effectiveness while paying comparatively little attention to the economic value of these investments. Consequently, there remains limited empirical and conceptual understanding of whether the educational, institutional, and societal benefits generated by teacher training justify the considerable financial, administrative, and opportunity costs incurred during programme implementation.

Cost-Benefit Analysis (CBA) provides one of the most widely accepted economic evaluation techniques for assessing whether the total benefits of a programme exceed its total costs. The approach has been extensively applied in sectors such as healthcare, transportation, environmental management, labour economics, and public infrastructure to support evidence-based policy decisions and efficient resource allocation. However, despite its proven usefulness, the application of Cost-Benefit Analysis within teacher education remains relatively limited, particularly in developing countries such as Nigeria.

Conventional approaches to evaluating teacher training often emphasize educational outcomes such as changes in teacher's knowledge, pedagogical competence, classroom practices, and students' academic achievement. Although these measures are important for determining programme effectiveness, they provide limited information about whether the educational benefits justify the financial administrative, and opportunity cost of training. Cost benefit analysis extends conventional evaluation by systematically comparing the resources invested in teacher training with the educational, institutional, economic, and social benefits generated over time. This broader perspective enables decision-making to assess not only whether a training programme is effective, but also whether it represents an efficient and worthwhile use of scarce public resources. This represents an important gap in both educational research and policy practice, especially at a time when governments face increasing demands for accountability, transparency, and value for public expenditure.

This proposed framework seeks to address this gap by developing a Cost-Benefit Analysis framework for evaluating teacher training in Nigerian Colleges of Education. The proposed framework integrates Human Capital Theory, the Economics of Education, and Cost-Benefit Analysis into a comprehensive model linking training inputs, implementation processes, immediate outputs, educational outcomes, and long-term economic and social returns. The framework provides policymakers, educational administrators, institutional managers, and researchers with a systematic approach for evaluating the efficiency, effectiveness, and sustainability of teacher training investments.

The significance of this paper extends beyond the Nigerian context. As countries continue to pursue Sustainable Development Goal 4 on inclusive and equitable quality education, improving the efficiency of educational investments has become an international policy priority. By demonstrating how Cost-Benefit Analysis can strengthen accountability, improve

resource allocation, and support evidence-based decision-making, the proposed framework contributes to the growing international discourse on educational finance, teacher development, and policy evaluation. It also provides a foundation for future empirical research aimed at quantifying the economic returns of teacher training programmes across different educational contexts.

PURPOSE OF THE STUDY

The purpose of this paper is to develop a Cost-Benefit Analysis (CBA) framework for evaluating teacher training in Nigerian Colleges of Education. The study seeks to examine the theoretical foundations underpinning investments in teacher training through the perspectives of Human Capital Theory and the Economics of Education. It also aims to develop a comprehensive Cost-Benefit Analysis framework that integrates teacher training inputs, implementation processes, outputs, outcomes, and long-term economic and social returns.

The study further seeks to critically review empirical evidence on teacher professional development, with particular emphasis on identifying gaps in the economic evaluation of teacher training programmes in Nigeria and comparable developing countries. In addition, the study examines the policy implications of integrating Cost-Benefit Analysis into the planning, financing, implementation, and evaluation of teacher training programmes in Nigerian Colleges of Education. The study is intended to provide recommendations for policymakers, educational institutions, and researchers on strengthening accountability, improving resource allocation, and promoting evidence-based decision-making in teacher education.

METHODOLOGY

Research Design

This study adopts a qualitative conceptual research design based on a critical review and synthesis of existing literature. A conceptual research design is appropriate because the study does not seek to collect or analyse primary empirical data; rather, it aims to integrate existing theoretical and empirical knowledge to develop a Cost-Benefit Analysis (CBA) framework for evaluating teacher training in Nigerian Colleges of Education. Such an approach is widely used in conceptual and policy-oriented studies where the objective is theory development and framework construction rather than hypothesis testing.

Sources of Data

The study relies exclusively on secondary data obtained from peer-reviewed journal articles, scholarly books, conference papers, government policy documents, and reports published by reputable international organizations, including UNESCO, the OECD, and the World Bank.

Additional evidence is drawn from studies on teacher professional development, Human

Capital Theory, the Economics of Education, and Cost-Benefit Analysis published between 2010 and 2025, with greater emphasis on recent literature to ensure the framework reflects current developments in educational policy and research. Priority was given to recent international studies while seminal works were included where necessary to provide the theoretical foundation for the study.

Literature Search and Section Criteria

Relevant literature for the study was identified through searches conducted mainly using Google and Google Scholar, together with relevant publications and policy documents from recognised institutions such as the National Commission for Colleges of Education (NCCE), UNESCO, the OECD, and the World Bank. The search focused on studies relating to teacher training, teacher professional development, teacher education financing, teacher quality, Human Capital Theory, Economics of Education, and Cost-Benefit Analysis. Different combinations of these terms were used to identify literature relevant to the objectives of the study.

The review mainly covered literature published between 2010 and 2025. However, earlier seminal works were retained where they were important to the theoretical foundation of the study, particularly Schultz (1961) and Becker (1964, 1993). Priority was given to peer-reviewed journal articles and other credible academic and institutional sources that provided useful evidence on teacher education, professional development, educational investment, financing, and economic evaluation. Studies were included when they had a clear connection with the focus of the paper and provided theoretical, empirical, conceptual, or policy evidence relevant to teacher training and its economic and educational outcomes. Materials that were duplicated, clearly unrelated to the objectives of the study, or lacked sufficient academic or institutional credibility were excluded.

In total, 20 publications and relevant policy and institutional documents were reviewed. The selected literature was critically examined and thematically synthesised to identify areas of agreement and disagreement, differences in research approaches, major findings, limitations, and implications for evaluating teacher training investments in Nigerian Colleges of Education.

Method of Data Analysis

The study employed qualitative thematic analysis to identify recurring patterns, similarities, differences, and key insights across the reviewed literature. The analysis involved a careful reading of the selected literature to identify issues and ideas that repeatedly emerged in relation to teacher training, teacher professional development, financing, teacher quality, educational outcomes, and economic and social returns to education. Similar issues were grouped together, while contexts and approaches were noted from these recurring issues, broader themes were developed and refined in line with the objectives and the research questions of the study. These themes were then compared across the reviewed studies to

identify areas of convergence, divergence, and gaps in the existing literature. The resulting themes were used to organise the synthesis of the evidence and to inform the development of the proposed Cost-Benefits Analysis framework for teacher training in Nigerian Colleges of Education

CONCEPTUAL LITERATURE

Teacher Training

Teacher training refers to formal and structured educational activities designed to equip teachers with the professional knowledge, pedagogical competence, instructional skills, and practical abilities required for effective teaching. It may include pre-service preparation as well as organized training interventions intended to improve teachers' professional competence and classroom effectiveness. In Nigeria, teacher training is particularly important because Colleges of Education play a central role in preparing teachers for the basic education sector (Abdul-Hamid et al., 2016; Adebayo, 2021).

Teacher training may focus on subject-matter knowledge, instructional practices, classroom management, assessment practices, technological competence, and other professional skills required for effective teaching. Evidence from Nigeria indicates that teacher development programmes can contribute to improvements in instructional quality, teacher competence, and school performance. However, inadequate funding, limited infrastructure, weak supervision, and inconsistent policy implementation can constrain the effectiveness and sustainability of teacher training programmes (Abdul-Hamid et al., 2016; Adebayo, 2021; Ogunode & Abubakar, 2021).

From an economic perspective, teacher training can be regarded as an investment in human capital because resources devoted to developing teachers' knowledge and skills may generate educational, institutional, economic, and social returns. This investment perspective provides an important basis for evaluating not only the effectiveness of teacher training but also the efficiency and value of the resources committed to it.

Teacher Professional Development

Teacher professional development refers to continuing learning and capacity-building activities undertaken by teachers to improve their professional knowledge, skills, instructional practices, and effectiveness throughout their careers. It includes continuing professional development (CPD) activities such as workshops, seminars, mentoring, coaching, curriculum implementation programmes, digital literacy training, and subject-specific capacity-building initiatives (Akyeampong, 2017; Akyeampong et al., 2011).

Unlike initial teacher training, which is primarily concerned with preparing individuals for entry into the teaching profession, professional development emphasizes continuous improvement after or alongside initial professional preparation. Effective professional

development enables teachers to respond to curriculum reforms, technological innovations, evolving pedagogical approaches, and changing learning needs. Evidence indicates that sustained professional learning, instructional coaching, mentoring, and content-focused professional development can improve teaching quality and, in some contexts, student learning outcomes (Akyeampong, 2017; Liu et al., 2025).

In Nigeria, Colleges of Education organize professional development activities to improve instructional quality and support educational reforms. However, the effectiveness of these programmes may be constrained by inadequate funding, limited infrastructure, weak monitoring systems, and inconsistent policy implementation (Adebayo, 2021; Ogunode & Abubakar, 2021). Consequently, attention should be directed not only to the educational effectiveness of professional development but also to the efficiency and sustainability of the resources invested in such programmes.

Cost-Benefit Analysis as an Evaluation Framework

Cost-Benefit Analysis (CBA) is a systematic economic evaluation technique used to determine whether the total benefits generated by a program exceed its total costs. The approach identifies measures, values, and compares both the costs and expected benefits of an intervention, thereby supporting rational decision-making and efficient resource allocation. Within teacher education, the costs of professional development extend beyond direct financial expenditures. Direct costs include facilitator fees, training materials, transportation, accommodation, instructional technologies, venue expenses, and administrative costs. Indirect costs include teachers' time away from classroom instruction, productivity losses during training periods, opportunity costs, and institutional overheads.

Similarly, the benefits of teacher training are multidimensional. Immediate benefits include improved teacher competence, enhanced instructional quality, increased professional confidence, and better classroom management. Intermediate benefits include higher student achievement, improved teacher retention, stronger institutional performance, and greater implementation of educational reforms. Long-term benefits include enhanced workforce productivity, increased national human capital, reduced educational inequalities, and broader socio-economic development. Although many of these benefits are not immediately measurable in monetary terms, Cost-Benefit Analysis provides established techniques for estimating both tangible and intangible returns. Consequently, CBA offers policymakers a rigorous framework for determining whether teacher training programs represent efficient and worthwhile investments (Angrist et al., 2025).

Unlike conventional educational evaluation, which primarily assesses whether teacher training produces improvements in teacher competence, instructional practice, or students learning outcomes, CBA evaluates the economic efficiency of the intervention by comparing its benefits with the resource required to implement it. This distinction is particularly important in Nigerian Colleges of Education. Where public resources are limited and

competing educational priorities require careful justification of expenditure. CBA therefore complements convention evaluation by providing information on value for money, opportunity cost, and the longer-term economic and social returns associated with teacher training investments.

THEORETICAL FRAMEWORK

Human Capital Theory

Human Capital Theory provides the principal theoretical foundation for this study. The foundational contribution of Schultz (1961) established the importance of investment in human beings, particularly through education, training, health, and the acquisition of productive skills, as a means of enhancing human productive capacity and contributing to economic development. Becker (1964, 1993) subsequently developed and formalised the economic analysis of human capital by explaining how investments in education and training generate returns through improvements in productivity and earnings. Together, the contributions of Schultz and Becker provide a strong theoretical basis for viewing expenditure on teacher training as an investment in human capital rather than merely as recurrent educational expenditure.

Within teacher education, Human Capital Theory suggests that investment in teachers' knowledge, pedagogical skills, technological competencies, and professional capabilities can improve their productive capacity and instructional effectiveness. These improvements may contribute to better classroom practices, enhanced student learning outcomes, stronger institutional performance, and broader socio-economic development. The theory therefore provides a justification for examining teacher training from an investment perspective and for assessing whether the educational and socio-economic benefits generated by such investments justify the financial, administrative, and opportunity costs incurred.

However, Human Capital Theory has limitations. Its emphasis on productivity and economic returns may understate the social, cultural, ethical, and professional dimensions of education that are not easily expressed in monetary terms. Consequently, while the theory provides an important foundation for the economic evaluation of teacher training, the assessment of teacher education should also recognise broader educational and social benefits that may extend beyond directly measurable financial returns.

Economics of Education as a Theoretical Perspective

The Economics of Education provides a complementary theoretical perspective for understanding how scarce educational resources can be allocated efficiently to improve educational outcomes and social welfare. It applies economic principles to educational planning, financing, resource allocation, productivity, and programme evaluation. From this perspective, educational investments should be assessed in terms of their effectiveness, efficiency, opportunity costs, and expected returns.

Hoxby (2000, 2002) made important contributions to the economics of education by examining school choice, educational productivity, resource allocation, and the relationship between institutional incentives and educational outcomes. Her work demonstrates that the productivity of educational institutions can be considered in relation to the resources they use and the outcomes they produce. This perspective is relevant to teacher training because investment in training should ultimately be assessed not only by the resources committed but also by the improvements in teacher quality and educational outcomes associated with those investments.

Hanushek (2011) further emphasizes the economic importance of teacher quality by demonstrating the relationship between teacher effectiveness, student achievement, and subsequent economic outcomes. His analysis shows that improvements in teacher quality can generate substantial economic value through their effects on student achievement and future earnings. This provides a strong economic justification for investing in teacher training and professional development, particularly where such investments can improve teachers' instructional effectiveness and student learning outcomes.

Similarly, Heckman, Humphries, and Veramendi (2018) contribute to the economics of education by examining the causal effects and returns to education, including effects on earnings and other life outcomes. Their findings demonstrate that the economic returns to education can extend beyond immediate educational outcomes and can vary according to the nature and timing of educational investments. This reinforces the importance of considering both the costs and the broader benefits associated with investments in education and human-capital development.

Taken together, the contributions of Hoxby (2000, 2002), Hanushek (2011), and Heckman et al. (2018) strengthen the Economics of Education perspective adopted in this study. Hoxby emphasizes educational productivity and resource allocation, Hanushek highlights the economic value of teacher quality, while Heckman and colleagues demonstrate the broader returns associated with educational investment. These perspectives provide a theoretical basis for examining teacher training as an investment whose costs should be assessed against its educational, institutional, economic, and social benefits. Consequently, Cost-Benefit Analysis provides an appropriate framework for determining whether investments in teacher training represent an efficient use of scarce educational resources.

Table 1: Summary of Theoretical Perspectives

Theory	Core Assumption	Contribution to Framework
Human Capital Theory	Investment in education, training and skills enhances individuals' productive capacity and can generate economic and social returns (Schultz, 1961; Becker, 1964, 1993).	Provides the theoretical justification for treating teacher training as an investment in human capital and explains how improvements in teachers' knowledge and skills can generate educational, economic and social returns.
Economics of Education	Educational resources are scarce and should be allocated efficiently among competing alternatives to maximise educational and social returns (Hoxby, 2000, 2002; Hanushek, 2011; Heckman et al., 2018).	Provides the basis for examining the efficiency, opportunity costs and returns associated with teacher-training investments and supports the need for systematic economic evaluation.

Source: Author's synthesis of the reviewed literature

INTEGRATION OF THE THEORETICAL PERSPECTIVES

This study integrates Human Capital Theory, the Economics of Education, and Cost-Benefit Analysis into a unified conceptual framework for evaluating teacher training in Nigerian Colleges of Education.

Human Capital Theory explains why investment in teacher development generates improvements in productivity and educational quality. The Economics of Education provides the rationale for allocating limited educational resources efficiently and evaluating alternative investment decisions. Cost-Benefit Analysis operationalizes these theoretical perspectives by providing a practical methodology for measuring programme costs, estimating educational and economic benefits, and determining whether teacher training investments produce positive net returns. The integration of these three perspectives forms a comprehensive analytical framework that connects teacher training inputs, implementation processes, educational outputs, institutional outcomes, and long-term societal benefits.

Unlike traditional evaluations that focus primarily on educational effectiveness, the proposed framework incorporates both educational performance and economic efficiency, thereby providing a more comprehensive basis for evidence-based policymaking, institutional planning, and accountability. Accordingly, the integrated framework positions teacher training not merely as an educational activity but as a strategic public investment whose value should be assessed through both educational outcomes and long-term economic returns. This integrated perspective represents the principal theoretical contribution of the present study

and provides the foundation for the conceptual framework developed in the subsequent section.

REVIEW OF EMPIRICAL LITERATURE

International Evidence on Teacher Training and Professional Development

A substantial body of international research demonstrates that teacher professional development is one of the most effective strategies for improving educational quality and student achievement. Evidence from both developed and developing countries indicates that sustained, collaborative, and practice-oriented professional development enhances teachers' pedagogical knowledge, instructional practices, classroom management, and professional confidence.

Recent meta-analyses have reinforced these conclusions. Liu, et al. (2025), in a comprehensive meta-analysis of studies on in-service teachers in STEM education, reported that professional development programmes significantly improve teachers' self-efficacy, instructional competence, and classroom effectiveness. The study further revealed that programmes characterized by extended duration, continuous support, and active teacher participation produced substantially stronger outcomes than short-term workshop-based interventions.

Similarly, Ventista and Brown (2023), through a systematic review of studies conducted across the United States, the United Kingdom, Australia, the Netherlands, and several European countries, found that professional learning communities, instructional coaching, mentoring, and content-focused professional development consistently improved teaching quality and, in many cases, enhanced student academic performance. Their findings suggest that continuous, school-based professional learning is generally more effective than isolated training events.

Evidence from high-performing education systems further supports sustained investment in teacher development. Countries such as Finland and Singapore have institutionalized continuous professional learning as an integral component of educational policy. These countries consistently report high student achievement, which has been partly attributed to systematic investment in teacher quality and continuous professional development (OECD, 2020). Although these international studies provide compelling evidence regarding the educational benefits of teacher training, relatively few extend their analysis to comprehensive economic evaluation. Most studies emphasize educational effectiveness while giving limited attention to whether the financial investments involved generate sufficient economic returns. Consequently, the international literature still presents opportunities for integrating educational evaluation with economic assessment through Cost-Benefit Analysis.

Empirical Evidence from Africa

Across Sub-Saharan Africa, teacher professional development has increasingly been recognized as a critical strategy for improving educational quality. However, implementation remains constrained by inadequate funding, weak institutional capacity, shortages of instructional resources, and inconsistent policy implementation.

Recent African literature indicates that teacher professional development remains an important component of improving teacher preparation and instructional quality, while also drawing attention to weaknesses in the design, delivery and sustainability of professional-development programmes Mitchell et al. (2024), in a critical synthesis of research on teacher professional development in Africa, found that professional-development provision across the continent varies considerably in terms of its purposes, delivery modalities, participants' experiences and outcomes. The authors further observed that professionally relevant and context-sensitive approaches are important for strengthening teachers' learning and agency, while standardised approaches may fail to adequately respond to teachers' diverse professional contexts. These findings suggest that the effectiveness of teacher professional development depends not only on whether training is provided, but also on how the training is designed, delivered and aligned with teachers' needs (Mitchell et al., 2024).

Similarly, Mgaiwa et al., (2024) examined teacher preparation and continuous professional development, with particular attention to the Tanzanian context and broader developments in teacher education. Their review highlights the need for stronger continuity between initial teacher preparation and subsequent professional development. The authors argue that teacher development should be understood as a continuing process rather than as two isolated stages of professional preparation. They further emphasise the importance of stronger institutional linkages and partnerships in supporting teachers' continuing professional learning.(Mgaiwa et al., 2024).

Taken together, these recent studies agree that teacher development requires sustained and context-responsive professional support, rather than relying solely on initial teacher preparation. However, they differ in emphasis. Mitchell et al. (2024) provide a broader African synthesis focusing on the nature, provision and outcomes of professional development, whereas Mgaiwa and Milinga (2024) provide a more country-focused perspective, particularly on the relationship between initial teacher preparation and continuing professional development. Methodologically, Mitchell et al. (2024) draw on a critical synthesis of African research evidence, while Mgaiwa and Milinga (2024) employ a review-based approach centred on teacher preparation and continuing professional development. The implication for the present study is that teacher-training investment should be examined beyond participation in training alone, with attention to the resources committed, quality and relevance of training, institutional arrangements, educational outcomes and the longer-term returns associated with teacher development.

Akyeampong et al. (2011), in a study conducted in Ghana, found that continuous professional development significantly improved teachers' pedagogical practices and classroom effectiveness. Nevertheless, the authors observed that inadequate funding, insufficient follow-up support, and limited monitoring reduced the long-term sustainability of training programs.

Similarly, Piper and Zuilkowski (2015), using a randomized controlled trial in Kenya, reported that structured teacher coaching and professional development programs significantly improved pupils' literacy achievement. Their findings suggest that carefully designed teacher training interventions can generate measurable improvements in student learning outcomes when implemented with adequate institutional support.

Despite these encouraging findings, African studies have largely concentrated on educational outcomes rather than economic efficiency. Very few investigations have systematically examined whether investments in teacher training produce benefits that justify their associated financial and opportunity costs. This limitation restricts policymakers' ability to determine the most cost-effective approaches to teacher professional development.

Empirical Evidence from Nigeria

Evidence from Nigeria indicates that teacher training and professional development are affected by financial, institutional, and policy-related constraints. Abdul-Hamid et al. (2016) found that teacher professional development in Nigeria faces challenges associated with inadequate funding, limited facilities, and weaknesses in implementation.

Similarly, Umar and Tahir (2020) reported that inadequate resources and institutional constraints affect the effective delivery of teacher development programmes. These findings demonstrate that the availability and utilisation of financial and institutional resources are important determinants of the effectiveness of teacher-development interventions.

The issue of teacher-education financing is particularly important for Colleges of Education, which constitute a major institutional component of teacher preparation in Nigeria. Okeke and Eze (2022), in their study of teacher-education financing in Nigeria, identified policy gaps and funding challenges that constrain the effective provision of teacher education. Such financing constraints can affect the availability of instructional facilities, training materials, staff development opportunities, and other resources required for effective teacher preparation. From a Cost-Benefit Analysis perspective, these financing challenges make it important to determine whether the resources committed to teacher education generate benefits that justify the financial and opportunity costs involved.

Teacher professional development is another important component of the Nigerian teacher-education system. Adebayo (2021) and Ogunode and Abubakar (2021) identified challenges relating to funding, infrastructure, monitoring, and policy implementation in teacher professional development. These findings suggest that the existence of professional-development policies does not automatically guarantee effective implementation. Sustainable

professional development requires adequate financial support, institutional capacity, appropriate monitoring mechanisms, and continuous opportunities for teachers to improve their professional competencies.

Prince et al. (2024) evaluated the Nigerian Government's Mandatory Continuing Professional Development Programme for primary school teachers in Ekiti State using a mixed-methods approach involving teachers, school heads and officials of the Teachers Registration Council of Nigeria. The study found that participation in the programme was associated with improved professional competence, commitment and continuing relevance to the teaching profession. However, the authors also identified the need for stronger funding and greater public awareness to sustain the programme. These findings reinforce earlier Nigerian evidence that professional development can contribute to teacher effectiveness but requires adequate institutional and financial support (Prince et al., 2024).

More specifically within the College of Education context, Adedejo et al. (2025) investigated the relationship between professional-development programmes and lecturers' job performance across nine Colleges of Education in Southwest Nigeria. Using data from 1,440 lecturers, the study found a statistically significant relationship between participation in professional-development programmes and lecturers' job performance ($r = .411$). The findings provide recent empirical support for the importance of seminars, conferences, workshops and training in strengthening the professional performance of lecturers in Colleges of Education.

Similarly, Oke et al. (2025) examined teacher quality in Nigerian Colleges of Education and identified continuing professional development and adequate funding of teacher education as important measures for improving teacher quality and national development. Their findings are particularly relevant to the present study because they link the quality of teacher preparation to both professional-development investment and financial resources.

The National Commission for Colleges of Education (NCCE) provides an important regulatory and quality-assurance framework for teacher education in Nigeria. The NCCE is responsible for coordinating teacher education outside universities and polytechnics, establishing minimum standards for teacher-education programmes, accrediting programmes and certificates, and providing guidelines for the accreditation of Colleges of Education (NCCE, 2023). Its Academic Programmes Department also oversees curriculum development for NCE-awarding institutions and evaluates the NCE In-service Teacher Programme (NCCE, 2023). These responsibilities make the NCCE an important institutional actor in the financing, implementation, quality assurance, and professional development dimensions of teacher education.

However, the regulatory framework primarily establishes standards and quality requirements; comparatively less attention is given to the systematic economic evaluation of the resources committed to meeting these requirements and the educational, institutional, and wider social

benefits generated. This provides a further justification for applying a Cost-Benefit Analysis perspective to teacher training in Nigerian Colleges of Education.

Taken together, the Nigerian evidence shows that financing, institutional regulation, and professional-development policy are closely interconnected. While existing Nigerian studies provide evidence on funding constraints, teacher development, institutional challenges, and policy implementation, limited attention has been given to systematically comparing the costs of teacher training with its educational, institutional, economic, and social benefits, particularly within the Colleges of Education context.

While Osiesi et al. (2024) provide evidence on the implementation and perceived outcomes of a national continuing professional-development programme, Adedejo et al. (2025) provide institution-specific evidence from Colleges of Education, and Oke et al. (2025) emphasise the interconnected roles of teacher quality, professional development and adequate financing. Thus, the studies generally converge on the importance of sustained investment and institutional support for teacher development, although they differ in population, institutional setting and methodological approach. Importantly, these studies primarily assess professional development and teacher quality rather than systematically comparing the financial costs of training with its educational, institutional, economic and social benefits. This remaining limitation provides a rationale for examining teacher training from a Cost-Benefit Analysis perspective.

A critical comparison of the Nigerian studies reveals considerable agreement regarding the major constraints affecting teacher training and professional development. Abdul-Hamid et al. (2016), Umar and Tahir (2020), Adebayo (2021), and Ogunode and Abubakar (2021) generally point to inadequate funding, limited institutional resources, weak monitoring, infrastructure deficiencies, and challenges in policy implementation as important factors affecting the effectiveness of teacher development. Thus, despite differences in the specific aspects examined, the studies converge on the view that the availability of adequate resources and effective institutional support is essential for successful teacher training and professional development.

However, the studies differ in their areas of emphasis and methodological approaches. While some focus more strongly on financing and institutional constraints, others examine teacher professional development, implementation challenges, or the conditions under which training programmes are delivered. These differences in focus mean that the studies do not provide exactly the same type of evidence. Evidence based on institutional or practitioner experiences may identify resource and implementation problems, whereas studies that focus on training outcomes may provide greater insight into whether professional-development activities translate into improvements in teacher competence or instructional practice.

The methodological differences among the studies also have implications for the interpretation of their findings. Differences in research design, study population, data sources,

geographical or institutional context, and measures of programme effectiveness can influence the type of conclusions reached. Consequently, evidence that a teacher-development programme improves professional competence does not necessarily establish that the programme is economically efficient. Similarly, evidence of inadequate funding does not, on its own, demonstrate whether additional expenditure would produce benefits greater than the costs incurred.

These areas of agreement and methodological variation have important implications for the present study. Existing Nigerian research provides useful evidence on the educational and institutional dimensions of teacher training, but comparatively less attention is given to systematically comparing the full costs of teacher training with its educational, institutional, economic, and social benefits. The differences in the focus and methods of existing studies therefore reinforce the need for a common analytical framework that can complement conventional assessments of teacher-training effectiveness. Cost-Benefit Analysis provides such a framework by enabling the costs of teacher training investments to be considered alongside their immediate and long-term benefits.

Critical Synthesis of the Literature

The reviewed literature demonstrates broad international consensus that teacher professional development contributes positively to instructional quality, teacher effectiveness, and student learning outcomes. Evidence from developed countries emphasizes the importance of sustained, collaborative, and practice-oriented professional learning, while African and Nigerian studies similarly report improvements in teacher competence despite persistent implementation challenges. Nevertheless, an important limitation emerges through literature. The overwhelming majority of studies evaluate teacher training using educational indicators alone, including teacher knowledge, classroom practices, instructional quality, and student academic performance. Comparatively little attention has been devoted to assessing the economic efficiency of teacher training investments through systematic comparison of programme costs and expected benefits.

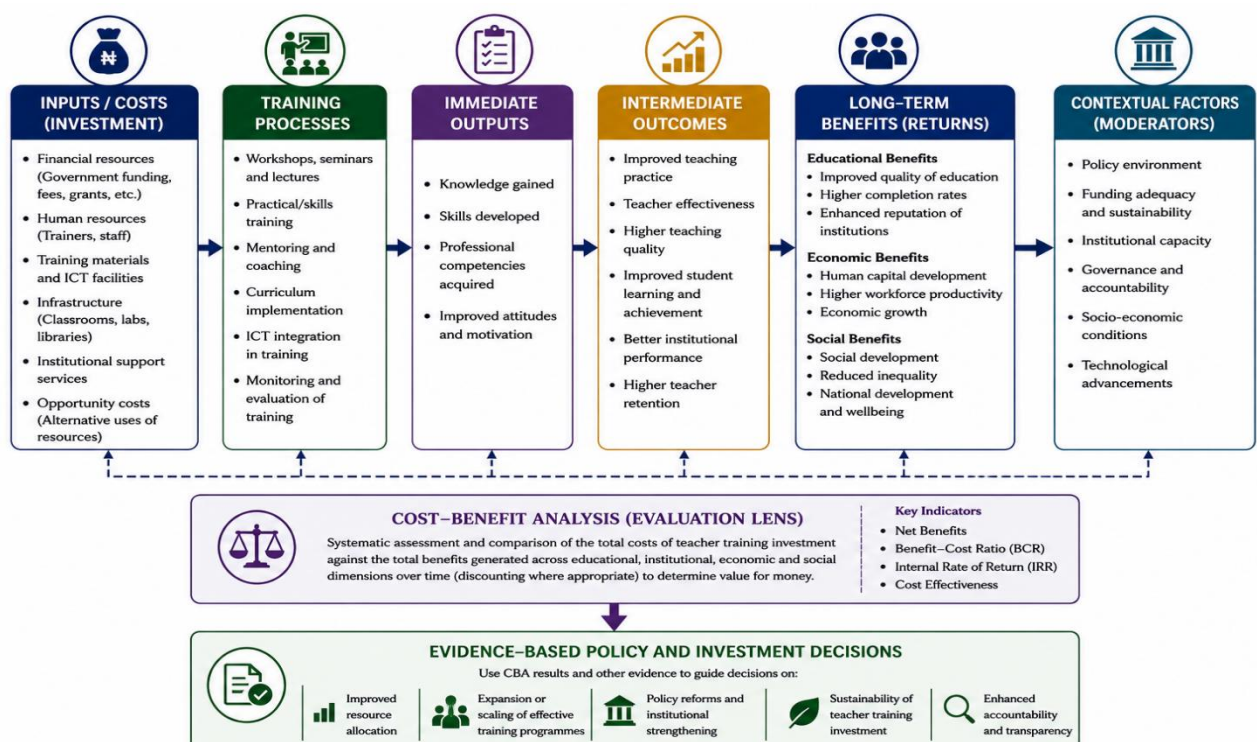
This limitation is particularly significant in developing countries such as Nigeria, where educational resources remain scarce and governments face increasing demands for accountability, transparency, and efficient public expenditure. Without rigorous economic evaluation, policymakers cannot determine whether existing teacher training programmes represent the most efficient use of limited educational resources.

Research Gap

The foregoing review reveals several important gaps in existing literature. First, although numerous studies have established the educational benefits of teacher professional development, relatively few have integrated educational effectiveness with economic evaluation. Second, empirical evidence applying Cost-Benefit Analysis to teacher training

remains extremely limited, particularly within developing countries. Third, Nigerian studies have concentrated predominantly on programme implementation, instructional effectiveness, funding constraints, and policy challenges, while largely overlooking the economic justification of teacher training investments. More importantly, to the best of the authors' knowledge no comprehensive conceptual framework currently exists that systematically integrates Human Capital Theory, the Economics of Education, and Cost-Benefit Analysis for evaluating teacher training in Nigerian Colleges of Education. Existing Nigerian studies have largely examined teacher training and professional development in term of teacher competence, institutional constraints, financing, and policy implementation, and educational outcomes (Abdul-Hamid et al., 2016; Umar & Tahir, 2020; Adebayo, 2021; Ogunode & Abubakar, 2021). This theoretical and methodological gap limits evidence-based policymaking and efficient allocation of educational resources. Accordingly, this paper addresses this gap by developing a Cost-Benefit Analysis framework that links teacher training inputs, implementation processes, educational outputs, institutional outcomes, and long-term economic returns. The proposed framework contributes to both the theoretical literature and education policy by providing a practical analytical tool for evaluating the efficiency, effectiveness, and sustainability of teacher training investments in Nigerian Colleges of Education.

Figure 1: Proposed Conceptual framework for Cost-Benefit Analysis of teacher training investment in Nigerian College of Education



Source: Developed by the Authors (2026)

Explanation of the Framework

The framework begins with input, which represents the financial, human, technological, and institutional resources invested in teacher training. These resources determine the quality and scope of professional development programs implemented within Colleges of Education.

The second stage consists of training processes, including workshops, seminars, mentoring, coaching, curriculum implementation activities, digital skills training, and programme monitoring. The effectiveness of these implementation processes determines the quality of learning experiences provided to teachers. Successful implementation produces immediate outputs, including improved pedagogical knowledge, stronger instructional skills, enhanced classroom management, increased digital competence, and higher levels of professional confidence among teachers. These outputs subsequently generate broader outcomes, such as improved student academic performance, better instructional quality, increased teacher retention, enhanced institutional effectiveness, and greater public confidence in teacher education.

The framework further assumes that sustained improvements in educational outcomes contribute to long-term returns, including stronger human capital formation, increased labour productivity, improved national competitiveness, poverty reduction, and sustainable socio-economic development. The central innovation of the framework is the incorporation of Cost-Benefit Analysis as the principal evaluation mechanism. Rather than evaluating teacher training solely on educational outcomes, the framework systematically compares programme costs including direct, indirect, and opportunity cost with educational, institutional, economic, and social benefits. This comprehensive assessment enables policymakers to determine whether teacher training programs generate positive net social benefits and represent efficient use of public resources. Finally, the results of the Cost-Benefit Analysis inform evidence-based policy decisions, enabling governments, institutional leaders, and education planners to prioritize investments that maximize educational quality, institutional efficiency, accountability, and long-term national development.

The framework analysis therefore provides a comprehensive analytical model for evaluating teacher training investments in Nigerian Colleges of Education and serves as a practical guide for future empirical research seeking to measure the economic returns of teacher professional development programmes.

In comparison with the previous conceptual model reviewed in this study, the proposed framework extends the analysis beyond teacher competencies, professional developments activities, and educational outcomes by explicitly connecting the resources and costs invested in teacher training with its educational, institutional, economic, and social returns, while existing models largely emphasise the effectiveness and outcomes of teacher development, the proposed framework incorporates Cost-Benefit Analysis as an explicit evaluation lens through which direct, indirect, and opportunity costs are considered against the

multidimensional benefits generated over time. This distinguishes the proposed framework by treating teacher training not only as an educational intervention but also as an investment decision, with the resulting economic evidence informing resource allocation and policy decisions in Nigerian Colleges of Education.

Discussion of Findings

The primary contribution of this paper is the development of a comprehensive Cost-Benefit Analysis (CBA) framework for evaluating teacher training in Nigerian Colleges of Education. By integrating Human Capital Theory, the Economics of Education, and Cost-Benefit Analysis into a unified analytical model, the study extends existing scholarship on teacher professional development beyond conventional assessments of educational effectiveness to include economic efficiency and long-term societal returns. This integrated perspective represents an important contribution to education policy and educational finance literature, particularly in developing countries where public resources are limited and competing developmental priorities require evidence-based investment decisions.

The review of empirical literature confirms the broad international consensus that teacher professional development improves instructional quality, teacher competence, classroom practices, and student learning outcomes. Evidence from high-performing education systems, including Finland and Singapore, as well as studies conducted across Africa, consistently demonstrates that sustained and well-designed professional development programmes enhance educational performance. These findings reinforce the argument of Human Capital Theory that investments in teacher knowledge and professional skills generate productivity gains that extend beyond individual teachers to educational institutions and national economies. However, the analysis also reveals an important limitation in existing literature.

Although numerous studies have documented the educational benefits of teacher training, relatively few have systematically evaluated whether these benefits justify the financial resources invested. Most previous research measures programed success using indicators such as teacher competence, student achievement, or instructional quality, while largely overlooking questions of efficiency, value for money, and long-term economic returns. This omission is particularly significant in developing countries where education budgets are constrained, and governments must make difficult decisions regarding the allocation of scarce public resources.

The framework addresses this limitation by introducing Cost-Benefit Analysis as the central mechanism for evaluating teacher training investments. Rather than viewing professional development solely as an educational intervention, the framework conceptualizes teacher training as a strategic public investment whose effectiveness should be assessed through both educational outcomes and economic returns. By systematically comparing programed costs with educational, institutional, economic, and social benefits, the framework provides policymakers with a more comprehensive basis for determining whether teacher training

initiatives represent efficient and sustainable investments.

Another important finding emerging from this study is the recognition that the benefits of teacher training extend far beyond immediate classroom improvements. Enhanced teacher competence contributes to improved student achievement, stronger institutional performance, greater teacher retention, and improved implementation of educational reforms. Over time, these educational improvements strengthen national human capital, increase labour productivity, support economic growth, and contribute to broader social development. These findings support international evidence that investments in teacher quality produce multiplier effects across education systems and national economies.

The study also highlights the importance of adopting a long-term perspective when evaluating teacher training programmes. Although many of the costs associated with professional development occur during programme implementation, the educational and economic benefits often accumulate gradually over many years. Consequently, evaluation approaches that focus exclusively on short-term educational outcomes may substantially underestimate the overall value of teacher training investments. Incorporating long-term benefits into programed evaluation enables governments and educational institutions to make more informed and sustainable investment decisions. From a policy perspective, the proposed framework provides practical guidance for improving education financing and accountability in Nigerian Colleges of Education.

Integrating Cost-Benefit Analysis into programme planning and evaluation would enable governments, institutional administrators, and development partners to identify teacher training initiatives that generate the greatest educational and economic returns. Such an approach would strengthen transparency, improve resource allocation, promote accountability, and ensure that limited educational resources are directed towards interventions capable of producing measurable and sustainable impacts.

The framework also contributes to the broader discourse on educational governance by encouraging a shift from expenditure-based budgeting to investment-oriented planning. Rather than measuring success solely by the number of financial resources allocated to teacher development, policymakers should increasingly evaluate whether those investments generate demonstrable improvements in educational quality, institutional effectiveness, and national development. This perspective aligns with contemporary international efforts to promote evidence-based policymaking, performance-based budgeting, and efficient management of public educational resources.

Despite these contributions, the present study has certain limitations. As a conceptual paper, the framework has not yet been empirically tested using primary or secondary quantitative data. Consequently, the relationships between programme costs, educational outcomes, and long-term economic returns remain theoretical and require empirical validation. Furthermore, some educational and social benefits associated with teacher training, including

improvements in professional ethics, leadership, learner well-being, and community engagement, are inherently difficult to quantify in monetary terms. Future research should therefore apply the framework across different Colleges of Education and other teacher education institutions using longitudinal and mixed-method research designs to estimate the actual economic returns of teacher training investments.

Overall, this study proposes that integrating Cost-Benefit Analysis into the evaluation of teacher training can provide a more comprehensive understanding of programme value than conventional educational assessment alone. By linking educational outcomes with economic efficiency and long-term societal benefits, the proposed framework offers a broader analytical basis for information education policy, improving accountability and supporting sustainable investment in teacher development within Nigeria and other developing countries facing similar educational and fiscal challenges.

Policy Implications and Recommendations

The Cost-Benefit Analysis (CBA) framework has important implications for education policy, institutional governance, and resource management in Nigerian Colleges of Education. As governments continue to invest substantial public resources in teacher education, there is an increasing need to ensure that these investments produce measurable educational, institutional, and socio-economic returns. Integrating Cost-Benefit Analysis into teacher education policy would strengthen evidence-based decision-making, improve accountability, and enhance the efficiency.

First, the Federal Ministry of Education, the National Commission for Colleges of Education (NCCE), and State Ministries of Education should institutionalize Cost-Benefit Analysis as a standard component of planning, budgeting, implementation, and evaluation of teacher professional development programs. This would ensure that investment decisions are guided by empirical evidence regarding program effectiveness and economic efficiency rather than administrative routine or political considerations.

Second, Colleges of Education should establish comprehensive monitoring and evaluation systems capable of tracking both the costs and outcomes of teacher training programs. Such systems should capture direct costs, indirect costs, and opportunity costs alongside measurable indicators of program effectiveness, including improvements in teacher competence, instructional quality, student learning outcomes, teacher retention, and institutional performance. Reliable data generated through these systems would provide a stronger evidence base for future policy decisions and resource allocation.

Third, policymakers should prioritize sustained, needs-based, and practice-oriented professional development programs over short-term and fragmented training initiatives. International evidence consistently demonstrates that continuous mentoring, coaching, collaborative professional learning communities, and classroom-based support produce more

sustainable improvements in teaching quality than isolated workshops or one-off seminars. Aligning teacher development programmes with demonstrated educational needs is likely to maximize both educational outcomes and economic returns.

Fourth, government agencies should strengthen investment in digital infrastructure and technology-enabled professional development. Expanding access to digital learning platforms, virtual training programmes, online mentoring, and educational technologies can improve the accessibility, scalability, and cost-effectiveness of teacher professional development, particularly in resource-constrained environments. Such investments are increasingly important as education systems continue to adapt to technological change and digital transformation.

Fifth, stronger collaboration should be encouraged among Colleges of Education, universities, government agencies, international development partners, and the private sector in the design, financing, implementation, and evaluation of teacher development programs. Multi-stakeholder partnerships can enhance program quality, facilitate knowledge sharing, mobilize additional financial resources, and strengthen institutional capacity for conducting rigorous economic evaluations.

The framework also has significant implications for educational governance. By integrating Cost-Benefit Analysis into institutional planning, Colleges of Education can move beyond expenditure-based budgeting towards performance and investment-oriented management. Such an approach promotes transparency, accountability, and efficient utilization of limited educational resources while supporting continuous institutional improvement. From a broader policy perspective, adopting Cost-Benefit Analysis in teacher education contributes directly to national development priorities by strengthening human capital formation, improving workforce productivity, and enhancing educational quality. It also aligns with the aspirations of Sustainable Development Goal for (Quality Education), which emphasizes equitable access to quality education, effective teachers, and lifelong learning opportunities. Evidence-based investment in teacher development is therefore not only an educational necessity but also a strategic instrument for sustainable socio-economic development.

Finally, future research should move beyond conceptual analysis by empirically applying the proposed framework across Colleges of Education and other teacher education institutions in Nigeria. Quantitative and mixed-method studies should estimate the actual costs and long-term educational, economic, and social benefits associated with teacher training programmes. Such evidence would validate and refine the framework while providing policymakers with practical guidance for designing more efficient and sustainable teacher development policies. In conclusion, the adoption of the Cost-Benefit Analysis framework offers a practical pathway for improving the planning, implementation, financing, and evaluation of teacher training programmes in Nigerian Colleges of Education. By promoting evidence-based policymaking, efficient resource allocation, and greater accountability, the framework has the potential to strengthen teacher education and contribute meaningfully to national educational

transformation and sustainable development.

Trustworthiness of the Study

To enhance the credibility and trustworthiness of the conceptual framework, evidence was triangulated from multiple high-quality sources, including peer-reviewed academic publications, policy reports, and international institutional documents. The integration of Human Capital Theory, the Economics of Education, and Cost-Benefit Analysis further strengthens the theoretical rigor of the framework. In addition, the study maintains transparency by clearly describing the literature selection process and analytical approach, thereby enhancing the reliability and applicability of its conclusions.

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