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Implications**

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Abstract

Purpose: The purpose of this comprehensive study is to investigate the challenges Pakistani teacher education institutes have in incorporating 21st-century skills into their curricula. Subsequently looks into the difficulties of converting content-based curricula to SDG 4 competency-based frameworks, assesses how well teacher education policies align with the OECD Education 2030 framework for transformative competencies, and finds policy gaps that restrict SDG 4 targets from integration into teacher preparation programs.

Materials and Methods: The study uses a qualitative, comparative multiple case study design and utilizes an interpretivism perspective. The main source of data is document analysis, which includes policy documents from websites, national teacher education programs, curriculum frameworks 2026, and academic journal articles released in the previous five years. Five countries were chosen via purposeful sampling. Germany, Japan, Australia, Turkey, and Italy based on recognized innovation or effectiveness in teacher education changes, the availability of pertinent policy papers, and the diversity of educational systems. To identify similarities, differences, and applicable policy lessons, comparative policy analysis is conducted.

Findings: The integration of 21st-century competencies presents significant structural and pedagogical challenges for Pakistani teacher education institutions. These challenges include inadequate technology integration, poor implementation, weak alignment with modern skills, and disparities between policy goals and classroom realities.

Implications to Theory, Practice and Policy: Curriculum and workforce policies need to be revised to require ongoing, structured professional development for teachers; incorporate digital and AI proficiency as essential standards; institutionalize collaborative collective sense-making through specialized learning communities; bolster teaching practice through organized school partnerships; develop teacher preparation that is informed by research and involves the community; and implement governance reforms that guarantee implementation fidelity. It is crucial to make consistent investments, develop capability, and change the culture to support lifelong learning.

Keyword: *Comparative International Strategies, Curriculum Reforms, Emergence, Thinking, Pedagogical Leadership, Teacher Education, Teacher Leadership*

INTRODUCTION

The curriculum reforms in OECD countries focus on modernizing teacher education to meet the demands of digital literacy and 21st-century skills such as teamwork and critical thinking. However, Muhammad et al. (2024) stated that Pakistan's teacher education programs face challenges due to outdated curricula and insufficient practical experience.

Problem Statement

Alam (2025) stated that it is still unclear whether OECD reform models can be applied to Pakistan, especially in light of socioeconomic limitations, governance frameworks, and cultural contexts. Problem of the statement indicates the demands of the twenty-first century, including critical thinking, digital literacy, collaboration, creativity, and inclusive pedagogies, teacher education systems around the world are undergoing substantial curriculum reforms. To conform to competency-based frameworks, evidence-based practice, and professional standards, numerous OECD nations have redesigned their teacher education programs (Organization for Economic Co-operation and Development (OECD, 2018). On the other hand, despite reforms like the Higher Education Commission-backed introduction of the four-year B.Ed. (Hons) program, teacher education in Pakistan still faces structural and curriculum issues (Bashir et al., 2021). Although the goal of these reforms was to modernize teacher preparation, issues with poor implementation, weak alignment with 21st-century competencies, poor technology integration, and discrepancies between the goals of the policy and the realities of the classroom still exist (Lauwerier, 2018).

Research Purpose

Additionally, the Purpose of the study specify the challenges of comprehending and SD4 on the effects of curricular change in teacher education in a global setting. It aims to investigate how these reforms might include in Pakistani policy in order to raise the ability and efficacy of teacher training programs. Further, Significance of the study detailed a comparative knowledge of global reform initiatives, the study's findings will add to the scholarly conversation on teacher education reform. It will assist legislators and educational planners in comprehending how effective reforms have been applied in various settings. Moreover, recent advances in knowledge, technology, and international educational standards have caused our nation to review and revamp teacher preparation programs.

Evaluating OECD reform experiences could offer flexible solutions for improving Pakistan's teacher education to align with current educational needs (Simona & Berit, 2025). The main research question motivates to find; How to resolve Pakistani teacher education difficulties in incorporate with 21st-century competencies into their curriculum? Further deep understanding developed by the questions; i- What challenges exist in shifting from content-based curricula to SDG 4 competency-based curricula in teacher education curriculum? ii- How aligned are Pakistan's national teacher education policies with the OECD Education 2030 framework for transformative competencies? iii- What policy gaps hinder the integration of SDG 4 targets into teacher preparation programs? Moreover, the objectives of the study are; to explore the difficulties faced by Pakistani teacher education institutions in integrating 21st-century competencies into their curriculum. To investigate the challenges in shifting from content-based curricula to SDG 4 competency-based curricula in teacher education programs. To examine the alignment between Pakistan's national teacher education policies and the OECD Education 2030 framework for

transformative competencies. To identify the policy gaps that hinder the integration of SDG 4 targets into teacher preparation programs in Pakistan.

Research Gap

The gap of the study specified curriculum reform is widely discussed globally, but local research on implementation and relevance is limited. Research shows that curriculum changes in Pakistan are frequently policy-driven but lack systematic evaluation, contextual adaptation, and stakeholder engagement (Maksud & Muhammad, 2020). According to Gita (2025) stated that qualitative studies have examined how international reform models are interpreted by policymakers, teacher educators, and institutional leaders, as well as how these reforms are felt at the institutional level.

To Identify the Policy Gaps that Hinder the Integration of SDG 4 Targets into Teacher Preparation Programs in Pakistan

The study finds a number of important policy gaps that prevent Pakistan's teacher preparation programs from integrating the SDG 4 aim. First, curriculum modifications are often policy-driven without significant stakeholder participation or local research on implementation efficacy; there is a dearth of systematic evaluation and contextual adaptation of reforms. Second, despite the fact that NACTE standards require learning management systems and technology integration, many institutions lack the infrastructure, internet connectivity, smart classrooms, and assistive devices that are required. This creates a substantial digital divide that threatens competency-based learning. Third, teacher professional development is still sporadic and underfunded; in contrast to the mandatory, ongoing training models in Germany and Japan, Pakistani teacher educators frequently lack continual support in inclusive education, current pedagogy, and assessment design. Fourth, the implementation of teaching practice and monitoring is dispersed due to ongoing governance inadequacies in coordination between teacher education institutions, schools, and legislators. Fifth, even though the policy encourages research and community involvement, there is still a lack of a true research culture that informs curriculum reform, which restricts the advancement of evidence-based pedagogy. Lastly, significant transformation is still hampered by exam pressure, teacher reluctance to change, and tight educational funding (Wan et al., 2026). Equally, study comes to the conclusion that closing these policy gaps calls for ongoing funding, institutional capacity building, cultural shifts toward lifelong learning, and a systemic dedication to reflective practice throughout Pakistan's whole teacher education system.

LITERATURE REVIEW

The paper address to examining curriculum reform initiatives in teacher education across selected countries and international education systems. It focuses on policy frameworks, structural changes in teacher education curricula, and the integration of modern pedagogical approaches, technology, and competency-based learning in teacher training programs.

Theoretical Framework

The theoretical framework also clarifies how strategic uncertainty can be turned into a chance for better teaching. School administrators can support teachers in making context-sensitive decisions while upholding curriculum standards and institutional objectives rather than seeing uncertainty as merely a limitation. Curriculum discretion thus serves as a tool for teachers to continuously improve their teaching methods. In addition, Fullan's Educational Change Model offers a helpful framework for investigating the direct effects of macro-level policy changes on teacher agency.

Curriculum Discretion through Contingency Theory

There isn't a single ideal management approach for every circumstance, according to contingency theory. According to Liaqat et al. (2026). The setting, surrounding circumstances, organizational requirements, resources at hand, and the type of problems an organization faces all influence effective management. Contingency theory offers a crucial theoretical framework for developing instructional perfection amid strategic uncertainty in connection to Curriculum Discretion Theory; the autonomy to choose what, how, and when to educate based on the needs, interests, skills, and classroom circumstances of the pupils. Instead of strictly adhering to the curriculum, it enables teachers to modify it (Pilar et al., 2026). Hence, the professional space and flexibility that educators and school administrators have to adapt, interpret, prioritize, and implement curriculum in accordance with contextual circumstances is known as curricular discretion.

Therefore, rapid social, political, technical, and economic shifts in Pakistani education have left educators and decision-makers worried. The challenges of the 21st century cannot be satisfied by traditional teaching approaches that simply concentrate on finishing textbooks and being ready for exams. In these situations, education must encourage students' critical thinking, flexibility, creativity, and lifelong learning. Through enhancing instructional strategies, incorporating technology, and fostering meaningful learning experiences, a strong teaching curriculum and pedagogical approach can assist schools in effectively responding to evolving educational requirements. Thus, Mohammad and Maria (2023) specified creating a planned teaching and learning paradigm is crucial to raising the standard of education in Pakistan and equipping students for the challenges of the future. Political shifts, curricular reforms, technology advancements, economic constraints, linguistic disputes, and poor school facilities are just a few of the numerous uncertainties that Pakistan's education system must deal with. Because of these difficulties, instruction shouldn't be limited to helping students finish their coursework or get ready for tests. Rather, education should foster critical thinking, flexibility, and problem-solving skills in both teachers and students. In this context, Sari e al. (2025) stated that curricular strategy is a long-term strategy that outlines what teachers should teach, what students need to acquire, and how schools should adapt to evolving social and educational demands. In a similar manner, pedagogical strategies are instructional techniques and approaches that support students' successful and meaningful learning.

Teachers do not have to be faultless or ideal in every classroom setting in order to achieve pedagogical perfection. Instead, it refers to learner-centered classrooms, reflective teaching, adaptable approaches, ethical teaching techniques, and successful learning outcomes. Therefore, Inez et al. (2023) detailed that teacher who can adjust to changing circumstances, inspire students, implement cutting-edge teaching strategies, and maintain students' active participation in the process of learning is more likely to be successful in uncertain circumstances than one who attempts to control all areas of the classroom. This method promotes student uniqueness, self-assurance, and lifelong learning.

Moreover, foundational learning is the initial stage in a plan of action for Pakistan. Teachers should concentrate on helping kids enhance their emotional growth, language comprehension, basic reading, and numeracy skills. Thus, these fundamental abilities are crucial since they serve as the cornerstone for subsequent education and academic achievement. According to Sharon e l. (2024) indicated higher levels are frequently difficult for students who struggle with reading, writing, language comprehension, or fundamental math issues.

Then, integrating critical thinking into instruction and learning is the second phase. Studies on curriculum reform in Pakistan emphasizes how critical it is to lessen memorization and encourage critical thinking in the classroom. Therefore, Cris (2024) detailed that important to teach students how to ask questions, assess the facts, come up with original solutions to issues, and rationally communicate their viewpoints. Moreover, this type of education equips students to be knowledgeable citizens who can responsibly and thoughtfully handle problems in the real world.

The third phase concentrates on preparing future teaching and learning curriculum for digital and artificial intelligence. Hence, digital literacy, safe AI use, online research techniques, and cyber ethics should all be taught in modern schools. Students in Pakistan must learn how to use digital technologies efficiently and morally as technology continues to affect companies and society worldwide. Additionally, Mitchell and Buntic (2023) stated that curriculum change is currently seen by international educational research as crucial to educating students for societies led by artificial intelligence, through help students acquire the skills necessary for the modern world, teachers should include technology into their lesson plans.

Policy Borrowing Theory for Teaching Curriculum Reform

Furthermore, Fullan contends that the mere introduction of a new policy or reform does not bring about educational improvement. Teachers encounter as a change agent and carry out change by interpreting, adapting, accepting, negotiating, or occasionally opposing policy demands.

Developments that take place at the national or system level, such curricular reforms and new assessment guidelines, are referred to as macro policy shifts. The policy may increase teacher agency if educators are provided with opportunities for professional growth, collaborative possibilities, encouraging leadership, and some flexibility in implementing the reform

Hence, curriculum implementation to be successful, the fourth step is professional growth for teachers. Consequently, teachers need ongoing training in inclusive education, technology use, 21st century pedagogy, classroom management, and assessment design is the part of curriculum reforms, frequently fail in the classroom when they are implemented without adequate teacher assistance and professional development. Hence, nonetheless, a number of issues still outbreak Pakistan's educational system, including as political meddling, inadequate funding for education, uneven school facilities, antiquated teacher preparation programs, exam pressure, and opposition to change. According to analysis, many innovations are still only found in policies and are not successfully applied in classrooms (Michael, 2018). Therefore, attaining high-quality education in Pakistan requires enhancing teacher preparation and making sure that reforms are implemented practically.

However, context of conclusion, Pakistan's educational system needs to be flexible and modern with the goal to adjust to the fluctuations of the modern world. Additionally, the quality of education and student outcomes can be greatly enhanced by an organizational curriculum and pedagogical model built on critical thinking, digital and AI preparation, foundational teacher learning, and teacher professional development (Tariq et al., 2024). Even though implementation is still hampered by issues including scarce resources, political meddling, antiquated training programs, and opposition to change, significant adjustments are still achievable with careful planning and professional assistance. Lastly, Pakistan may train educators to become competent, responsible, and self-assured pedagogical leaders who can thrive in a world that is constantly changing by encouraging learner-centered education and adaptable teaching methods.

Conceptual Framework

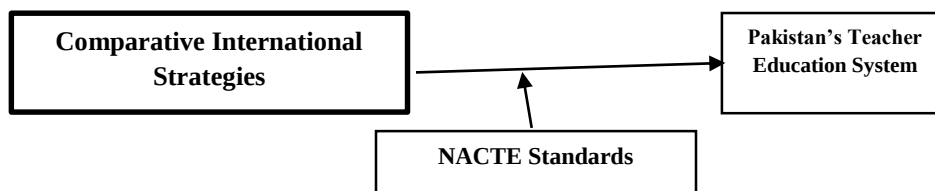


Figure 1: Conceptual Framework

Source; Researcher (2023)

Figure 1. Conceptual framework that links five states' comparative-oriented strategies to improve Pakistani curricular innovation and pedagogy. This framework combines regional regulatory constraints with international educational standards to provide a comprehensive approach to teacher professional development in Pakistan. Appropriate to ensure that the curriculum integrates contemporary pedagogical approaches, universal teaching standards, and worldwide technical improvements, the pathway depends on Comparative International practices on the input side. It incorporates the National Accreditation Council for Teacher Education's (NACTE) Standards concurrently), which base the curriculum on the unique cultural, national, and legal educational requirements of Pakistan. The focuses of the given conceptual model variables through develop NACTE polices by comparative international strategies for Pakistan's teacher education, come together to provide a cohesive educational route that aims to close the gap between local realities and global greatness. The framework's ultimate goal is to mold Pakistani teachers into internationally competitive, locally grounded educators who can raise the nation's classroom teaching standards to an international level.

Learning Thinking's Emergence

According to the paradigm offered, the "emergence of thinking" refers to the conceptual development and justification for the creation of this educational pathway. It demonstrates a purposeful transition from solitary, conventional training to an advanced, dual-lens approach to teacher preparation. The fundamental idea arises from the understanding that contemporary education cannot live in a vacuum; a successful Pakistani teacher must be both globally competent and locally responsive. This way of thinking rejects a one-size-fits-all strategy by combining two different philosophies: the national paradigm (NACTE Standards) and the global paradigm (Comparative International). According to the framework's basic logic, national standards offer the crucial cultural background, values, and regulatory alignment, while international best practices supply the innovation, contemporary pedagogy, and technology tools required for the twenty-first century. In the end, the rise of this way of thinking indicates a deliberate desire to improve the teaching profession. The combination of these two pressures produces a pathway intended to foster critical thinking, adaptability, and high-level competences rather than merely preparing teachers to pass local exams. As a result, the final product Pakistan's teacher is redefined as a globally competitive professional capable of elevating the nation's educational standards to an elite level.

Advancement of Pathway Thinking

A change from a fixed, one-dimensional training paradigm to a dynamic, ecosystem-based method for teacher education is reflected in the growth of this route thinking. The framework goes beyond

basic classroom management to include global digital literacy, inclusive education, and cross-cultural pedagogical abilities by methodically linking Comparative International standards with NACTE Standards. This broader perspective sees teacher development as an ongoing, dynamic process where worldwide ideas are continuously filtered via national filters to fit local classrooms, rather than as a static checklist of credentials. As a result, this integrated approach guarantees that Pakistani teachers are taught as forward-thinking professionals who can translate global educational trends into effective, locally relevant classroom methods that satisfy 21st-century expectations rather than in isolation.

Continual Group Sense-Making

This framework's iterative collective sense-making idea emphasizes the cooperative, continuous communication needed to strike a balance between global developments and regional realities. Policymakers, NACTE members, and international educational specialists are among the educational stakeholders who start this process by interpreting and filtering Comparative International benchmarks through the prism of Pakistan's distinct cultural and legal environment. This approach functions as a continual loop of feedback and improvement rather than a one-time curriculum design; as national NACTE Standards are revised and global pedagogical trends change, educators and institutions must jointly reevaluate how these components intersect. Through a common vision of what high-quality, globally aligned education looks like in a Pakistani classroom, this shared, iterative reflection guarantees that the final curricular pathway remains flexible and profoundly relevant, continuously molding Pakistan's teachers.

Comparing Forecasting to Optimistic Planning

Within this concept, the shift from predictive analysis to hopeful planning signifies a change from recognizing possible obstacles in schooling to actively creating a positive, forward-thinking future roadmap. Educational planners use predictive analysis to evaluate current trends and determine how a growing discrepancy between local teaching practices and global standards may leave future generations unprepared for a world that is changing quickly. The system actively combines Comparative International benchmarks with NACTE Standards to develop a proactive curricular roadmap, using this data for hopeful strategizing rather than letting these forecasts cause concern. This change turns a systemic exposure into a strategic opportunity; it shifts the focus from merely forecasting educational deficiencies to purposefully providing Pakistani teachers with the resources, agency, and contemporary skills necessary to confidently create a more promising and globally competitive academic environment

MATERIAL AND METHODS

The development, administration, and advancement of nations are significantly influenced by their policies. Thus, a nation's political priorities, economic circumstances, and social demands are reflected in the formulation and execution of its policies. Likewise, a better understanding of how governments create policies to address domestic issues and establish sustainable development by looking at the policy frameworks of five separate nations. (IEA TIMSS & PIRLS, n.d.). First the Germany: Germany has a well-organized system of teacher education that is overseen by individual states in accordance with national regulations. So, university coursework and hands-on school instruction are the two primary stages of teacher preparation. In addition to specializing in subjects like physics or math, teachers also study educational sciences. Hence, guarantee excellent teaching techniques, evaluation procedures, and educational innovation, the government has

established national standards. Moreover, teachers must routinely participate in professional development programs to advance their subject-matter expertise and instructional strategies through regional and local educational authorities, Germany's management leadership system promotes ongoing development. Second, the Japan: The Ministry of Education and regional boards of education oversee Japan's highly structured teacher education program. Teachers must pass employment exams, earn teaching credentials, and finish authorized university programs. Additionally, new teachers go through a year of training. Subject knowledge and practice in the classroom are the main goals of teacher education. Through conferences, classes, and lesson study techniques, Japan actively encourages professional development, where educators collaborate to enhance their approaches. In Japan, educational leadership places a strong emphasis on teamwork, discipline, and ongoing teacher development. Third, the Australian Institute for Teaching and School Leadership (AITSL) is in charge of the country's teacher education program. More, national professional standards that emphasize professional knowledge, teaching practice, and involvement are followed in the design of teacher education programs. Additionally, teachers are advised to specialize in disciplines like science or math after completing minimum four years of postsecondary education. Eventually, professional development and leadership are highly valued in Australia. Schools encourage a culture of continuous improvement and continual learning, and teachers frequently take part in training programs. Fourth, the Turkey: Address the expanding demands of basic and secondary education, Turkey changed its stance on teacher education. So, before becoming official instructors, educators must pass national exams and finish four-year university degrees. Programs for teacher education emphasize both subject-matter expertise and instructional techniques. Thereby planning professional development initiatives in collaboration with academic institutions and public organizations, the ministry of education assumes a significant leadership role. Additionally, teachers have access to online training possibilities. Planning training in accordance with national priorities and educational demands is the main emphasis of the management system. Last, the Italy: After obtaining teaching credentials in Italy, educators must finish both a university education and a practical internship. While secondary teachers may pursue specialized training pathways such as the TFA internship program, primary teachers complete a five-year degree program with internships. Academic instruction and hands-on classroom experience are combined in Italy's teacher education policy. Additionally, the nation has implemented measures to enhance teacher training and recruiting. Professional development training, particularly online learning, is mandatory for newly hired teachers. In Italy, educational leadership is concentrated on enhancing digital learning environments, practical teaching experiences, and the caliber of teachers. Although the five nations have diverse approaches to teacher education, they all prioritize raising the level of quality of teaching and career advancement. Japan and Germany place a strong emphasis on ongoing education and organized training. Australia encourages leadership development and national standards. Italy blends university education with real-world internships and contemporary innovations, while Turkey concentrates on central management and teacher assistance. Generally, good teacher education programs have traits like strong managerial leadership and ongoing professional improvement.

An investigation using longitudinal data into Pakistan's existing pedagogical training, learning, and curriculum. The updated accreditation requirements for Pakistani teacher education schools are presented by the National Accreditation Council for Teacher Education and will go into effect on January 1, 2026. The framework places a strong emphasis on learning environments, professional competencies, curricular alignment, pedagogical training, and institutional

responsibility in teacher education programs (Francesca & Christine, 2019). In accordance with the National Professional Standards for Teachers (NPSTs), it creates a thorough quality assurance system for training future educators. Developing and implementing a curriculum that supports contemporary pedagogical methods and teacher competencies is a primary focus. Incorporating stakeholder comments, research findings, and technological improvements, the curriculum must be in line with the institution's vision, mission, and NPSTs. According to the Marilde and Luis (2021) specified guidelines, teacher education institutions must update their curricula on a regular basis to reflect the demands of employers, students, teacher educators, and new developments in education. ICT, hands-on activities, current learning materials, and evaluation techniques that encourage active learning and classroom participation should all be incorporated into the curriculum. These metrics show that learner-centered and competency-based teacher education is replacing traditional material delivery. Through organized curriculum implementation and classroom management techniques, the framework places a heavy emphasis on pedagogical training. IT-based teaching materials, collaborative teaching techniques, and a variety of instructional approaches are all demanded of teacher educators. The criteria place a strong emphasis on prompt feedback, well-organized course delivery, and upkeep of course files that include lesson plans, tests, attendance, and educational activities. Additionally, teacher educators are urged to establish inclusive classroom settings that promote engagement, self-regulated learning, group projects, dialogue, and practical experiences (Rosalinda & Andrea, 2023). This illustrates the policy's dedication to reflective and interactive teaching methods as opposed to memorization. The most important aspects of pedagogical preparation are teaching practice. Before entering classrooms for teaching practice, the standards mandate that aspiring teachers complete rigorous training in lesson planning, classroom monitoring, exercises, and microteaching. Likewise, teaching practice guides, lesson plans, supervision standards, and evaluation criteria must be provided by educational institutions. Thus, effective field experiences are said to need coordination between teacher educators, cooperative schools, head teachers, and supervision staff. Besides, Remi et al. (2024) indicated the necessity of reflective teaching practice reports and portfolios that record lesson plans, supervisor comments, and difficulties encountered, and professional development during school placements is also emphasized in the paper. So, this illustrates a method to experiential learning intended to connect theory with classroom realities.

Even though, learning policies and student advancement systems are another significant aspect of the paper. Throughout the program, institutions must monitor the growth of knowledge, skills, and professional dispositions, maintain acceptable student-teacher ratios, and establish clear admissions standards. More, continuous assessment systems must use formative and summative methods that are in line with NPSTs to measure cognitive, behavioral, and practical competencies (Samuel & Adesoye, 2024). Further, as a step toward critical and reflective learning, the standards also mandate that evaluation procedures incorporate higher-order thinking abilities like synthesis and analysis (Jordi et al., 2020). Although, guarantee equity, responsibility, and ongoing development in teacher education programs, objection procedures, quality improvement plans, and feedback systems are also incorporated. Then, the incorporation of technology into instruction, learning, and evaluation is also heavily emphasized in the papers. Therefore, Seda (2023) stated that digital tools for assessment, online tests, immediate feedback, and individualized instruction for children with special needs are demanded of teacher educators. Moreover, Josephine (2025) stated that learning management systems (LMS), internet connectivity, smart classrooms, multimedia infrastructure, and technological assistance must all be maintained by educational

institutions. These standards are a reflection of current educational policies that acknowledge technology-enhanced learning and digital literacy as crucial elements of successful pedagogy and teacher development. Afterward analyses stated the accrediting requirements also acknowledge the significance of institutional resources and supporting learning settings for pedagogical efficacy. Consequently, academic and extracurricular development must be supported by accessible infrastructure, libraries, labs, sports facilities, and inclusive learning environments. In same context, it is expected that libraries have current print and digital materials that are in line with national teacher education policies and curriculum standards (Okeoma et al., 2023). These clauses emphasize the knowledge that sufficient academic and physical resources are just as important to good teaching and learning as curriculum excellence. Moreover, the context mandates that teacher education programs uphold explicit governance structures, operational policies, ethical codes, and self-assessment procedures with regard to institutional learning policies and management. Besides, professional qualifications, ongoing supervision, and chances for professional growth are essential for teacher educators (Sana & Akhtar, 2024). Ensuing, the guidelines support non-discriminatory behaviors, gender-sensitive policies, and peaceful institutional settings (Chiara & Grazia, 2026). These actions show a policy focus on professionalism, educational equity, and long-term institutional development. Further, the educational goals of the certifying requirements also incorporate research and community involvement. Similarly, institutions are urged to support academic and student research especially that tackles regional and national educational challenges (Uriel, 2024). Subsequently, to provide evidence-based pedagogical improvement, research findings are anticipated to influence curriculum change and instructional strategies. In addition, community outreach projects and cooperative activities that link aspiring educators with social and educational development initiatives must be established by teacher education programs (Mary, et al., 2022). This is a reflection of a more general educational perspective that sees educators as agents of community development and social transformation.

All things considered, the updated certification criteria offer a thorough foundation for improving teaching curriculum, learning policies, and pedagogical training in Pakistan's teacher education institutions. Competency-based education, reflective teaching methods, technology integration, ongoing evaluation, inclusive learning settings, and curriculum development informed by research are all encouraged in this paper. The framework aims to develop professionally competent, ethically responsible, and technologically proficient teachers who can address today's educational challenges by placing equal emphasis on theoretical preparation and real-world teaching experience (NAECTE, 2026).

Methodology

The study primarily explores reforms implemented in the 21st century and analyzes their implications for policy development, teacher competency, and educational quality. It also considers the influence of international organizations and global education trends on teacher education reforms. Similarly, therefore, Delimitation the study is delimited to curriculum reform in teacher education and does not include reforms in general school curricula or higher education programs unrelated to teacher preparation. It focuses mainly on policy-level reforms and curriculum design rather than the detailed evaluation of classroom implementation. Furthermore, the study relies on secondary data sources such as research articles, policy documents, and international reports. Lastly, curriculum reform refers to the systematic process of reviewing,

redesigning, and improving the structure, content, objectives, and teaching approaches of an educational curriculum to meet changing educational needs, societal demands, and global standards. In the context of teacher education, curriculum reform involves updating teacher preparation programs to enhance pedagogical skills, professional competencies, and the ability of teachers to address contemporary classroom challenges. Thus, international reform refers to policy changes, strategies, and initiatives in education that occur across different countries or are influenced by global educational trends and international organizations. These reforms often involve the adoption of innovative practices, comparative policy learning, and collaboration among nations to improve education systems, particularly in areas such as teacher education, curriculum development, and educational quality assurance.

Conceptualizing Policy Analysis for Teacher Education of Five Nations

The interpretivism paradigm of the study approach focuses on comprehending the meanings, viewpoints, and policy objectives underlying curriculum modifications. It highlights five nations develop and carry out teacher education reforms. Therefore, qualitative, comparative research design to examine curricular reform in teacher education in several worldwide contexts and to assess the consequences for policy. It makes it possible to comprehend reform procedures, policy goals, and national contexts in great detail. Moreover, purposive sampling will be used in the study to choose nations with significant teacher education improvements. It will also concentrate on locating and evaluating relevant documentation and guidelines created during a specified period of time, particularly within the last five years. Additionally, this study will use document analysis as its source. These include, curriculum frameworks, national teacher education plans, and scholarly journal articles. This method enables a methodical analysis of policy directions and reform practices in different nations. Thus, depending on the study's objectives, a multiple case study approach will be used to look at a few chosen nations, including Germany, Japan, Australia, Turkey, and Italy. Purposive sampling will be used to select these cases based on a number of factors, such as the availability of pertinent policy papers, acknowledged success or originality in changes, and diversity in educational systems. Furthermore, a comparative policy analysis will be carried out to find commonalities and variations between examples and to extract policy lessons that can be applied to other situations find parallels, gaps, and applicable policy lessons, comparative policy analysis will also be carried out and only uses publicly accessible records, there are no direct ethical risks related to data gathering from sources MPDI, Emerald, Taylor and Francis, Science Direct, Wiley online library, Google books, IJITL, YED.JEL,

FINDINGS

comparison of Pakistan's present pedagogical training and learning strategies with those of five other countries. Thus, comparative analysis provides insights into the efficacy of governance in various national contexts by highlighting the procedures, methods, and results of policy execution. According to the NACTE accreditation requirements, Pakistan's teacher education strategy is very comparable to that of Germany, Japan, Australia, Turkey, and Italy. Curriculum development, instructional methods, professional skills, evaluation, research, and management leadership are the main areas of emphasis in Pakistan. The policy highlights the need for teacher education programs to adhere to the National Professional Standards for Teachers (NPSTs), incorporate ICT integration, modern teaching techniques, classroom practice, and ongoing evaluation of aspiring teachers. Similar to Germany and Japan, Pakistan places a high value on hands-on teaching experience through classroom observation, lesson design, teaching practice, and school

monitoring. Pakistan has systems for the professional development of teacher educators and support staff, just as Germany and Japan greatly encourage ongoing professional development. Lifelong learning, leadership, and national professional standards are highlighted in Australia's teacher education policy. Through NACTE and NPSTs, Pakistan also employs a standards-based strategy that guarantees quality assurance, monitoring, and development plans in teacher education institutes. Whereas, Pakistan promotes digital learning, online assessment tools, Learning Management Systems (LMS), and technology integration in teaching and assessment methods, Turkey concentrates on centralized planning, teacher assistance, and online training opportunities. Similar to Pakistan's focus on teaching practice portfolios, classroom experience, and teacher professional development, Italy integrates university education with real-world internships and mandatory professional development. All of these nations, including Pakistan, seek to raise the standard of instruction through professional development, teacher preparation, real-world classroom experience, and strong educational leadership. However, Pakistan is still developing execution, research culture, digital learning, and quality verification systems in teacher education institutes, whereas Germany, Japan, and Australia have more organized systems for ongoing teacher training and leadership development. By enhancing curricular standards, assessment techniques, infrastructure, research, and community involvement, Pakistan's policy demonstrates significant attempts to modernize teacher education.

Collective Sense-Making through the Next Stage

The teacher education, iterative collective sense making refers to the ongoing collaboration between educators, educational leaders, and institutions to enhance instruction and learning via dialogue, introspection, feedback, and shared experiences (Jayce et al., 2022). Therefore, this process is evident in curriculum creation, professional training, evaluation, and classroom practices in the teacher education systems of Germany, Japan, Australia, Turkey, Italy, and Pakistan. In order to enhance the quality of instruction, Germany and Japan constantly urge teachers to work together through workshops and lesson study techniques. Australia encourages collaboration and professional learning communities where educators and school administrators exchange ideas and work together to enhance performance. Moreover, to improve teacher training and professional development, Turkey and Italy also encourage collaboration between academic institutions, government agencies, and educational institutions. Likewise, Pakistan's NACTE standards place a strong emphasis on stakeholder feedback, teacher-educator collaboration, ongoing evaluation, research, and quality improvement strategies. Thus, Xijuan and Lei (2023) validates that teacher education is a continuous cycle of learning, reflection, cooperation, and improvement in which all stakeholders contribute to improved educational outcomes rather than a one-time event.

Forecasting Certainties to Creating Pathways

Cutting-edge Pakistani teacher education, the transition from an indicator certainty to pathway construction entails moving away from conventional fixed teaching approaches and toward a more adaptable, cooperative, and constantly evolving educational system. In the past, teacher education mostly concentrated on adhering to predetermined guidelines, rigid curricula, and exam-based learning with the belief that a single, uniform method could satisfy all educational requirements. The updated NACTE requirements, however, demonstrate a shift toward creating new avenues for teacher development via research, creativity, reflection, technology integration, and stakeholder involvement. More, Christopher et al. (2019) specified dynamic and changing approach to teacher

education is reflected in the policy, which promotes curriculum revision based on input from teacher educators, students, employers, and research findings. Additionally, professional development, instructional strategies, digital learning, self-evaluation, and community involvement are highlighted by this pathway creation strategy (Nantapoom et al., 2026). Instead of depending solely on conventional classroom education, teachers are urged to employ a variety of teaching techniques, ICT resources, and collaborative learning methodologies. In that context, creating lifelong learners, reflective practitioners, and capable educational leaders who can adapt to shifting social, technical, and educational demands is now the main goal of Pakistan's teacher education program. In this sense, Pakistani teacher education is progressively shifting away from strict predictability and toward a situation built on ongoing learning, creativity, mutual understanding, and advancement.

DISCUSSION

The study's conclusions offer a methodical framework for addressing Pakistan's teacher education challenges in integrating 21st-century skills into its curricula. The comparison of Germany, Japan, Australia, Turkey, and Italy shows that the solution is not in a single reform but rather in a comprehensive, multifaceted approach that combines specific NACTE requirements with global best practices. According to Figure 1, Pakistan must transition from traditional content-based models to a flexible, competency-based system that prioritizes critical thinking, fundamental learning, digital and AI preparedness, and ongoing professional development for teachers. Predictive certainty, which prioritizes fixed curricula and examination-based learning, must give way to pathway construction, which encourages creativity, introspection, stakeholder involvement, and iterative collective sense-making among teacher educators, legislators, and educational institutions.

Then, response to the first sub-question about the obstacles in transitioning from content-based curriculum to SDG 4 competency-based curricula, the document identifies a number of enduring issues. Next, despite legislative rhetoric, the fundamental obstacle is the deeply ingrained culture of memorization and textbook completion, which is resistant to change. Inadequate technological integration, poor implementation, a lack of connection with 21st-century competences, and a mismatch between policy objectives and classroom reality continue to plague Pakistani teacher education programs (Carl, 2023). Political meddling, tight educational funding, uneven school infrastructure, antiquated teacher preparation programs, exam pressure, and educators' resistance to change all impede this development. There is a significant disconnect between curriculum design and pedagogical practice, as the accrediting standards themselves recognize that many innovations are still restricted to policy texts without effective classroom application.

Additionally, the study reveals a moderate but insufficient convergence between Pakistan's national teacher education programs and the OECD Education 2030 framework for transformative competencies in response to the second sub-question (OECD, 2030). The NACTE guidelines for Pakistan include a strong emphasis on curriculum updating based on input from stakeholders, ICT integration, hands-on activities, active learning techniques, and evaluation techniques that foster higher-order thinking abilities like synthesis and analysis. These components align with the OECD's transformative competences of taking responsibility, resolving conflicts and difficulties, and generating new value. However, Pakistan's system is still developing its implementation, research culture, and digital learning infrastructure, in contrast to Germany, Japan, and Australia, which have highly structured systems for ongoing teacher training, leadership development, and

professional learning communities. The systematic mechanisms for teacher agency and iterative collective sense-making, which are essential to OECD frameworks, are still underdeveloped, despite the policy alignment being mostly on paper (Simona & Berit, 2025).

Lastly, the study highlights a number of significant policy gaps that impede the integration of SDG 4 targets in response to the third sub-question. First, curriculum modifications are often policy-driven without significant stakeholder participation or local implementation studies; systematic evaluation and contextual adaptation of reforms are lacking. Second, many institutions lack the infrastructure, internet connectivity, smart classrooms, and assistive technologies required by the NACTE requirements for technology integration and Learning Management Systems. This creates a digital divide that threatens competency-based learning. Third, teacher professional development is still sporadic and underfunded; in contrast to the mandatory, ongoing training models in Germany and Japan, Pakistani teacher educators frequently lack continual support in inclusive education, current pedagogy, and assessment design. Fourth, the implementation of teaching practice and monitoring is dispersed due to ongoing governance inadequacies in coordination between teacher education institutions, schools, and legislators. Finally, even though the policy encourages research and community involvement, there is still a lack of a true research culture that informs curriculum reform, which restricts the advancement of evidence-based pedagogy. In addition to changing policies, Pakistan's teacher education system must continue to invest, develop capacity, and adopt a culture that values lifelong learning and reflective practice in order to close these inequalities

Conclusion

To explore the difficulties faced by Pakistani teacher education institutions in integrating 21st-century competencies into their curriculum. According to the report, combining 21st-century skills like critical thinking, digital literacy, teamwork, creativity, and inclusive pedagogies presents substantial structural and pedagogical challenges for Pakistani teacher education institutions. Even with policy rhetoric and improvements like the four-year B.Ed. (Hons) degree, there are still problems with inadequate technology integration, poor implementation, limited alignment with current capabilities, and differences between policy aims and classroom realities. Reform initiatives are nonetheless hampered by ingrained issues like political meddling, constrained educational funding, uneven school infrastructure, antiquated teacher preparation programs, exam pressure, and opposition to change. Additionally, traditional teaching strategies that emphasize finishing textbooks and preparing for exams continue to be prevalent, leaving little opportunity for learner-centered, adaptive, or reflective approaches (Kathleen, 2023). The study demonstrates that curricular changes in Pakistan are still often policy-driven but lack meaningful stakeholder involvement, contextual adaptation, and systematic evaluation.

Next, to investigate the challenges in shifting from content-based curricula to SDG 4 competency-based curricula in teacher education programs. The conclusion shows that, despite policy-level commitments, the deeply ingrained culture of memorizing and rote learning is the main obstacle to the transition from content-based to SDG 4 competency-based curriculum. Poor technological integration, a lack of alignment with competency-based frameworks, and large discrepancies between what regulations need and what really happens in classrooms are all problems with teacher education programs. Insufficient coordination between teacher educators, collaborative schools, and supervising staff, a lack of reflective teaching practices, a lack of continuous assessment systems that assess higher-order thinking skills, and a lack of practical teaching experience are

further obstacles. The study also shows that there is a significant gap between curriculum design and pedagogical practice, with many improvements remaining restricted to policy texts without successful classroom implementation. Furthermore, make it more difficult to implement competency-based models that have been successful in OECD countries (Junaid, Muhammad, & Ahsan, 2025).

Finally, to examine the alignment between Pakistan's national teacher education policies and the OECD Education 2030 framework for transformative competencies. Accordance to the study's findings, the OECD Education 2030 framework for transformative competences is somewhat but not entirely aligned with Pakistan's national teacher education programs. On the one hand, the NACTE accreditation criteria for Pakistan place a strong emphasis on curriculum revision based on input from stakeholders, ICT integration, hands-on activities, active learning techniques, and evaluation techniques that foster higher-order thinking abilities like synthesis and analysis. These components align with the transformative competencies of the OECD, which include taking responsibility, resolving conflicts and problems, and generating new value. However, the conclusion also shows that Pakistan's system is still in the early stages of strengthening implementation, research culture, and digital learning infrastructure, in contrast to Germany, Japan, and Australia, which have highly structured systems for ongoing teacher training, leadership development, and professional learning communities. Although there is some convergence at the policy-document level, systemic mechanisms for reflective practice, teacher autonomy, and iterative collective sense-making all of which are essential to the OECD framework remain underdeveloped and unevenly implemented across institutions

Recommendations

Contributions and implications redefining curriculum and workforce policy contributions.

1. **Comparative Framework for Curriculum Reform:** The study offers a methodical, comparative analysis of teacher education policies in five countries: Germany, Japan, Australia, Turkey, and Italy. It highlights common success factors like national standards, ongoing professional development, structured training, and real-world teaching experience. These observations provide Pakistan with a reproducible model to compare its own reforms to globally accepted frameworks.
2. **Conceptual Model for Local-Global Integration:** The creation of a conceptual framework (Figure No. 1) that clearly connects Pakistan's NACTE (National Accreditation Council for Teacher Education) standards with Comparative International methods is a noteworthy achievement. By combining international educational advances with regional cultural, legal, and regulatory needs, this framework offers a workable solution to close the gap between country realities and international excellence.
3. **Identification of Policy Gaps and Implementation Barriers:** Critical policy gaps impeding SDG 4 integration in Pakistan are methodically identified by the report. These gaps include poor stakeholder involvement, insufficient digital infrastructure, sporadic teacher professional development, disjointed governance coordination, and a lackluster research culture. The study provides useful information for evidence-based policy change by elucidating these challenges.

4. Shift from Predictive Certainty to Pathway Construction: The study promotes a theoretical change in teacher education from a rigid, content-based, examination-driven approach to a dynamic, competency-based one that emphasizes critical thinking, fundamental learning, digital and AI preparedness, and reflective practice. One important academic contribution is this rethinking of curriculum strategy as a means of managing strategic uncertainty.

Implications for Curriculum and Workforce Policy

1. Redefining Curriculum as a Dynamic, Competency-Based System: Curriculum policy needs to shift toward flexible, learner-centered, competency-based frameworks rather than static textbook material and exam preparation. The results suggest that curricula should be updated on a regular basis in response to comments from stakeholders (teacher educators, students, and employers), research findings, and technological developments. Higher-order cognitive abilities like analysis, synthesis, creativity, and problem-solving must take precedence over rote memory.
2. Mandating Continuous, Structured Teacher Professional Development: The outcomes for workforce policy are obvious: teacher professional development cannot continue to be sporadic or optional. Pakistan requires mandatory, ongoing training programs in classroom management, contemporary pedagogy, technology integration, inclusive education, and assessment design, drawing inspiration from Germany and Japan. Instead of being a sporadic addition, professional growth needs to be ingrained as a lifetime necessity.
3. Institutionalizing Iterative Collective Sense-Making: A combination of iterative collective sense-making continuous cooperation between educators, educational leaders, legislators, and institutions through dialogue, introspection, feedback, and shared experience should be formally established in workforce policy. Regular seminars, professional learning groups (like those in Australia), and lesson study techniques should become the norm rather than the exception.
4. Integrating Digital and AI Readiness as Non-Negotiable Standards: Digital literacy, safe use of AI, online research skills, and cyber ethics must be required in both curricula and workforce policies. Learning Management Systems (LMS), internet connectivity, smart classrooms, multimedia facilities, and assistive technologies must all adhere to strict regulations. Competency-based digital learning is still unachievable without infrastructure investment.
5. Strengthening Teaching Practice through Structured School Partnerships: Prior to school placements, the policy must mandate methodical preparation in lesson design, classroom observation, simulations, and microteaching. Reflective portfolios, supervision standards, teaching practice guides, and official collaboration between cooperative schools and teacher education institutions are crucial. Schools should be encouraged by workforce policy to actively participate in teacher preparation.
6. Building a Research-Informed and Community-Engaged Workforce: Policies pertaining to the workforce and curriculum should encourage faculty and students to conduct research on regional and national educational concerns, with the results immediately influencing curriculum reform. Furthermore, community outreach initiatives must be established by teacher education programs in order to position educators as agents of social change and community development rather than just classroom teachers.

7. Governance Reforms for Implementation Fidelity: lastly, improving governance mechanisms to guarantee that policy execution is not limited to paperwork is one of the implications of workforce policy. Transparent admissions processes, suitable student-teacher ratios, professional standards-aligned continuous evaluation systems, quality improvement plans, grievance procedures, and self-assessment mechanisms are all necessary for this. Enforcing gender-sensitive, non-discriminatory, and peaceful institutional contexts is vital.

Simply calling for a change from isolated, examination-focused teacher preparation to an integrated, competency-based, technology-enhanced, and constantly evolving approach, the study's contributions and implications together alter curriculum and workforce policy (Mudzakir & Aslan, 2025). Teachers in Pakistan are rethought not just as educators but as internationally competitive, locally rooted, adaptable professionals who can tackle the difficulties of education in the twenty-first century. Sustained investment, cultural transformation, and policy clarity at all governmental levels are necessary to realize this objective.

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Acknowledgments and Conflicts of Interest Declaration

It is acknowledged that make use of open excess information from policy websites are not subject to formal ethics evaluation because they were conducted using conventional educational techniques. Additionally, journals were informed declared that participation was completely voluntary and that their open access study work might be used for research purposes in accordance with the institutional research ethics policy and have no conflicts of interest. Finally, no personally identifying information was retained prior to analysis, and all materials were widely accessible on Google Scholar. The study adhered to recognized ethical standards for research enhancing teacher education policies.

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