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Issues and Ideas in Education

Stakeholders' Perception towards the Quality of Pre-Service Teacher Education: A Systematic Review

Rajashree Das[1], **Gouranga Charan Nanda**[1], **Sarat Kumar Rout**[1*], **Laxmidhar Muduli**[1] and **Bikshyatsib Sardar**[1]

[1]*Department of Education, Ravenshaw University, Cuttack, Odisha, India.*

[*]saratrout2007@rediffmail.com (Corresponding Author)

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ABSTRACT

Background: The quality of pre-service teacher education has gar-nered increasing global attention due to its pivotal role in shaping future educators. Stakeholders' perceptions—including those of stu-dent-teachers, faculty, policymakers, and mentors—provide critical insights into the strengths, limitations, and evolving needs of teacher education programs. Despite extensive research, there remains a lack of synthesized understanding concerning stakeholder perceptions across key dimensions such as technological integration, pedagogical practices, challenges, and professional development within pre-service teacher education from 2000 to 2025.

Purpose: This systematic review aims to analyze and consolidate existing literature on stakeholder perceptions of the quality of pre-service teacher education programs across a 25-year span. The objective is to identify key themes, gaps, and emerging trends to inform policy formulation and institutional reforms.

Methods: Using a systematic search strategy, 731 articles were initially retrieved from five databases: Google Scholar, ProQuest, Sci-enceDirect, and ERIC. After removing duplicates and applying screening criteria related to relevance, accessibility, and language, 55 studies were selected for final analysis. The review followed PRISMA (Preferred Reporting Items for Systematic Review and Meta-Analysis) guidelines, and the data were synthesized thematically, focusing on publication trends, research methods, geographical distribution, cita-tion impact, and core thematic areas.

Results: Findings reveal a fluctuating trend in publication volume, with qualitative methods being the most prevalent. The USA led in both publication count and average citation scores. Stakeholders highlighted several recurring themes, including the potential of technological tools to enhance teaching competence, persistent infrastructural and mentorship-related challenges, the importance of experiential learning, and the need for culturally relevant pedagogical models. Furthermore, gaps in assessment literacy, inclusion training, and technology integration persist despite recognized importance.

Conclusion: This review illustrates the importance of aligning teacher education programs with evolving educational technologies, inclusive pedagogies, and stakeholder expectations. The findings suggest the need for a more integrated, practice-oriented, and culturally responsive teacher preparation framework to meet contemporary educational demands.

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1. Introduction

The quality of pre-service teacher education is receiving growing worldwide interest because of its importance in developing future teachers. Quality in teacher education is critical and is under threat. There are no better assets than competent, committed, and engaged teachers in learning institutions. Quality teaching affects students' outcomes in a quantifiable way. An educational institution performs a significant function of providing learning experiences to lead its students from the darkness of ignorance to the light of knowledge (Kaur, 2013). The quality of pre-service teacher education plays a significant role in shaping the effectiveness of future educators and, consequently, the overall performance of educational systems. As teaching remains a cornerstone of national development, ensuring that teacher preparation programs meet high standards is essential. To develop the standard of pre-service teacher education

required on several dimensions. These dimensions are pedagogical skill, use of technology in the teacher education program, good teaching practices during the internship, use of different teaching strategies, and proper training during the teacher education program.

To develop the pedagogical skill Mixed Reality Situations (MRS), one of the effective training resources that enhanced pedagogical skills and classroom management, though technological improvements were needed to increase realism (Freeman & Lee, 2024). The integration of innovative technologies such as Mobile Augmented Reality (MAR), Digital Game-Based Learning (DGBL), and Generative AI into pre-service teacher education reflects a growing emphasis on enhancing engagement and learning outcomes through digital means. Technological tools are largely perceived as beneficial; their effective adoption hinges on contextual and structural factors, such as adequate training, time allocation, and institutional support. (Nizar *et al.*, 2024, Gumbi *et al.*, 2024). The internship experience played a vital role in shaping the professional growth of pre-service teachers, offering them valuable mentorship opportunities and hands-on classroom exposure. However, several challenges emerged, including insufficient internship duration, limited mentorship support, and organizational difficulties (Karsli & Yagiz, 2022). Core values like empathy, fairness, and inclusivity are widely recognized; applying them in classrooms is difficult due to limited training. University programs offer theoretical knowledge but fall short in preparing student teachers for real-world challenges. Additionally, teachers are often reluctant to share personal views due to fears of conflict with students, parents, or administrators (Singh & Mohalik, 2022; Yin, 2019; Zhang, 2010).

It is acknowledged that teachers take on considerable roles in meeting educational goals. The roles of teachers in the teaching-learning process become more complex. The issue of teacher training should be evaluated for many reasons. To begin with, complaints are obvious from teachers, school management, parents, and politicians about teaching practices. Secondly, several researched studies have taken place in the last years of the 21st century and provided sound rationales for some complaints regarding teacher training. The third one is that developments in the field of information happen, new meanings to information are ascribed, and new concepts for teaching and learning emerge (Korthagen *et al.*, 2006; Eryaman, 2007). This study seeks to understand the perceptions towards the quality of pre-service teacher education. It focuses on examining how the stakeholders' (teacher-educators, pupil-teachers, and administrators) perceptions regarding pre-service teacher education. The goal is to inform discussions on perceptions of pre-service teacher education to enhance quality and address challenges. To support this, a systematic review of the literature will address the following research questions:

1) What are the perceptions of stakeholders related to the quality of pre-service teacher education?
2) What challenges do stakeholders identify to quality in pre-service teacher education?

2. Methodology

Marangunić & Granić (2015) highlight the critical role of literature reviews in building a foundation of knowledge, suggesting that these reviews are essential for enhancing theories and addressing research gaps. They also bring to light some aspects of existing research that had been overlooked. Despite those insights, there remains a significant gap: no systematic literature review has been conducted in order to explore the perspectives of stakeholders on the quality of pre-service teacher education, nor has any study or review examined it on a global scale or internationally. This omission is notably important, as a systematic literature review would give valuable insight into stakeholders' perceptions of the quality of pre-service teacher education. Completion of this study would be beneficial for researchers and practitioners around the world, as it would provide them with a clearer understanding of the quality of pre-service teacher education.

2.1. Identification Phase

The database used for this systematic literature review included ResearchGate, Google Scholar, ProQuest, ScienceDirect, and ERIC. Three related search keywords were used to access the research studies from above mentioned electronic databases, as shown in Table 1.

Table 1: Literature Search Keywords

Database	Key words
ResearchGate	Perception of Teacher-educators AND Pre-service Teacher Education
	Perception of Pupil-teachers AND Pre-service Teacher Education
	Perception of Policymakers AND Pre-service Teacher Education
Google Scholar	Perception of Teacher-educators AND Pre-service Teacher Education
	Perception of Pupil-teachers AND Pre-service Teacher Education
	Perception of Policymakers AND Pre-service Teacher Education
ProQuest	Perception of Teacher-educators AND Pre-service Teacher Education
	Perception of Pupil-teachers AND Pre-service Teacher Education
	Perception of Policymakers AND Pre-service Teacher Education
ScienceDirect	Perception of Teacher-educators AND Pre-service Teacher Education
	Perception of Pupil-teachers AND Pre-service Teacher Education
	Perception of Policymakers AND Pre-service Teacher Education
ERIC	Perception of Teacher-educators AND Pre-service Teacher Education
	Perception of Pupil-teachers AND Pre-service Teacher Education
	Perception of Policymakers AND Pre-service Teacher Education

2.2. Screening Phase

The titles and abstracts of the research studies were screened in all five databases, namely ResearchGate, Google Scholar, ProQuest, ScienceDirect, and ERIC. The titles were screened based on how closely they matched the keywords. The abstracts of each study were then skimmed and scanned.

2.3. Inclusion and Exclusion Criteria

The findings were then screened based on the inclusion & exclusion criteria. A study was excluded if:

(1) The original language of writing is not English;
(2) Non-peer-reviewed;
(3) Non-empirical study; and
(4) The full text could not be found online.

The following types of studies were included:

(1) Peer-reviewed journal research articles;
(2) Review papers;
(3) Chapters in edited books; and
(4) Publically available master's and Ph.D. theses.

The search and screening process was summarized with the use of a PRISMA (Preferred Reporting Items for Systematic Review and Meta-Analysis) flow chart (Figure 1).

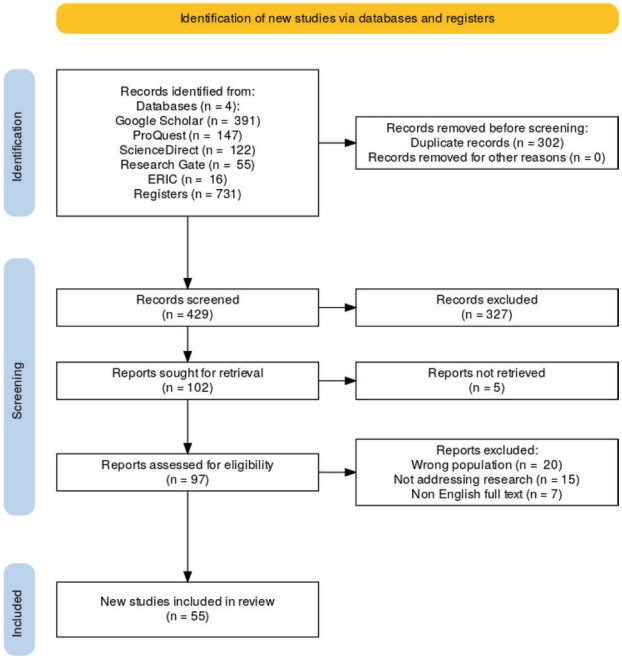

Figure 1: PRISMA (Preferred Reporting Items for Systematic Review and Meta-Analysis) flow chart

2.4. The Final Selected Studies

From 2000 to 2025, a total of 731 research studies were found from five databases and additional records, namely Google Scholar (n=391), ProQuest (n=147), ScienceDirect (n=122), and ERIC (n=16). During the screening process, 302 duplicate research studies were removed, leaving 429 research articles. After screening the research titles and abstracts, 327 articles were excluded from the obtained results. Then, 42 articles were removed because they did not have access to the full text and were comprised of the wrong population, did not address research, and were not in English. Finally, 55 articles were chosen from among those that met the inclusion criteria to be included in this review.

3. Results and Discussion

3.1. Characteristics of Included Studies

Table 2: Characteristics of Included Studies

No.	Author (Year)	Country	Method	Sample	Citation Index
1	Nizar *et al.* (2024)	Malaysia	Quantitative	456 pre-service teachers	01
2	Gill *et al.* (2009)	USA	Qualitative	140 pre-service teachers	16
3	Freeman & Lee (2024)	USA	Qualitative	57 pre-service teachers	05
4	Nguyen *et al.* (2024)	Vietnam	Mixed-methods	16 physical science teachers	02
5	Gumbi *et al.* (2024)	South Africa	Quantitative	255 pre-service teachers	16
6	Puerta (2024)	Spain	Qualitative	3 pre-service teachers	06
7	Karsli & Yağiz (2022)	Turkey	Mixed-methods	65 pre-service teachers	07
8	Ozdas (2018)	Turkey	Qualitative	42 pre-service teachers	43
9	Hu & Sperling (2022)	USA	Mixed-methods	101 pre-service teachers	28
10	Smit *et al.* (2024)	Netherlands	Qualitative	6 teacher educators	04
11	De la Hoz *et al.* (2024)	Spain	Quantitative	109 pre-service teachers	00
12	Badilla Quintana *et al.* (2017)	Greece	Mixed-methods	10 pre-service teachers	71
13	Avsec & Savec (2021)	Slovenia	Quantitative	225 university students	25
14	Giri & Pradhan (2024)	India	Quantitative	210 student teachers	00
15	Kesner *et al.* (2016)	USA	Quantitative	105 pre-service teachers	14
16	Young & Lewis (2008)	USA	Quantitative	92 pre-service teachers	90
17	Koca & Sen (2006)	Turkey	Quantitative	51 pre-service teachers	133
18	Li (2020)	USA	Qualitative	2 online graduate-level classes	124
19	McGarr (2024)	Ireland	Qualitative	21 teacher educators	02
20	Stites *et al.* (2018)	USA	Mixed-methods	120 pre-service teachers	156
21	Flores *et al.* (2014)	Portugal	Qualitative	47 pre-service teachers	78
22	Adhikary (2017)	India	Quantitative	100 teacher trainees	16
23	Ahsan *et al.* (2012)	Bangladesh	Quantitative	1,623 pre-service teachers	350
24	Costello & Boyle (2013)	Australia	Quantitative	193 pre-service teachers	236
25	Fatima & Zamir (2015)	Israel	Mixed-methods	30 teachers	09
26	Ezer *et al.* (2010)	New Zealand	Qualitative	97 student teachers	180
27	Barkhuizen & Feryok (2006)	New Zealand	Qualitative	15 pre-service ESL teachers	159
28	Hourani (2013)	Abu Dhabi	Qualitative	60 pre-service teachers	95
29	Choy *et al.* (2014)	Ghana	Quantitative	76 pre-service teachers	92
30	Paleeri (2017)	India	Mixed-methods	208 teacher educators	02
31	Akanzire *et al.* (2025)	Ghana	Quantitative	55 teacher educators	01
32	Aslan & Zhu (2015)	Turkey	Qualitative	782 pre-service teachers	151
33	Desta (2019)	Ethiopia	Qualitative	7 teacher educators	00
34	Amorim & Ribeiro-Silva (2024)	Portugal	Qualitative	7 pre-service teachers	04
35	Ijioma *et al.* (2014)	Nigeria	Quantitative	82 teacher educators	04
36	Atmaca *et al.* (2024)	Turkey	Mixed-methods	265 pre-service teachers	02
37	Hilden *et al.* (2022)	Finland	Mixed-methods	131 pre-service language teachers	13
38	Sanusi *et al.* (2024)	Nigeria	Quantitative	796 pre-service teachers	—

39	Salimi & Rad (2024)	Iran	Qualitative	15 multicultural education experts and 60 EFL teachers	08
40	Hernandez-Ocampo *et al.* (2024)	Colombia	Qualitative	179 participants	01
41	Reynolds *et al.* (2016)	Australia	Qualitative	7 pre-service teachers	38
42	Khalid *et al.* (2017)	UAE	Quantitative	294 pre-service teachers	20
43	Grobgeld *et al.* (2016)	Israel	Quantitative	500 teacher educators	32
44	Minor *et al.* (2002)	Georgia	Mixed-methods	134 pre-service teachers	670
45	Windfont (2024)	USA	Qualitative	15 teachers	01
46	Kamil (2011)	Kuwait	Qualitative	10 student-teachers	15
47	Fajet *et al.* (2005)	USA	Mixed-methods	62 pre-service teachers	326
48	Agyei & Benning (2015)	West Africa	Qualitative	85 pre-service teachers	43
49	Filiz & Durnali (2019)	Turkey	Qualitative	20 pre-service teachers	29
50	Singh & Mohalik (2022)	India	Quantitative	135 pre-service teachers and 17 aca-demics	00
51	Agarwal (2024)	India	Quantitative	107 pre-service teachers	00
52	Dejene *et al.* (2018)	Ethiopia	Quantitative	293 pre-service teachers	52
53	Swain *et al.* (2024)	India	Quantitative	304 pre-service teachers	00
54	Yin (2019)	South Korea	Qualitative	15 pre-service teachers	82
55	Zhang (2010)	USA	Qualitative	6 pre-service teachers	20

3.1.1. Year Wise Distribution of Selected Studies

Figure 2 depicts the year-wise number of publications of research articles on the perception of stakeholders towards the quality of pre-service teacher education from 2000 to 2025. The figure represents variation in the number of publications over years in the teacher education program. There is no discernable pattern of increasing or decreasing; rather, there is both increase and decrease in output in the teacher education program. The variability at the annual level is large. In particular, in 2000, 2001, 2003, 2004, 2007, and 2023, there were no publications; these zeroes might be due to lack of interest in the area, lack of funding to conduct research, or advancement in publication techniques. However, there is a peak in 2024 with seventeen publications.

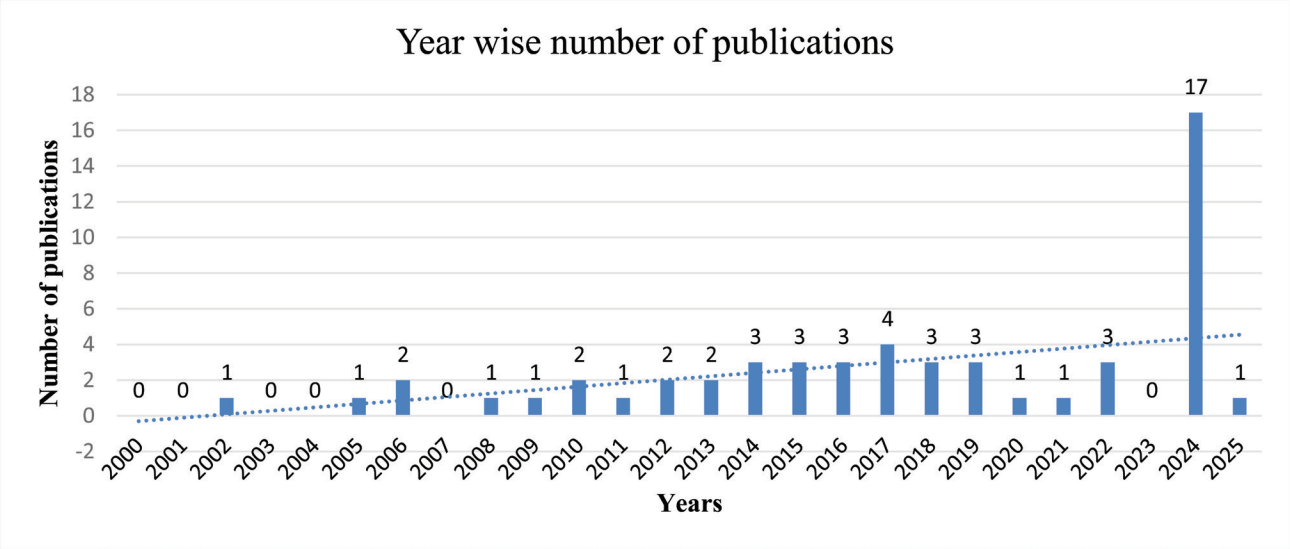

Figure 2: Year Wise Distribution of Selected Studies

3.1.2. Research Method Employed by Included Studies

With respect to research methods, Figure 3 shows the distribution of research methods used across the globe for the purpose of studying Stakeholders' Perceptions of the quality of Pre-service Teacher Education between 2000 and 2025. Qualitative methods were the most used, at 41.82 % of the research studies, followed by Quantitative method (38.12 %) and Mixed-Method (20 %). As demonstrated in Figure 3, there is a tendency toward qualitative methods, and thus imply a determination to expand generalizable findings across larger populations of potential interest to policymakers and educational administrators. Yet, the relatively low use of Mixed-Methods could indicate an absence of a nuanced understanding of Perception of Stakeholder Quality.

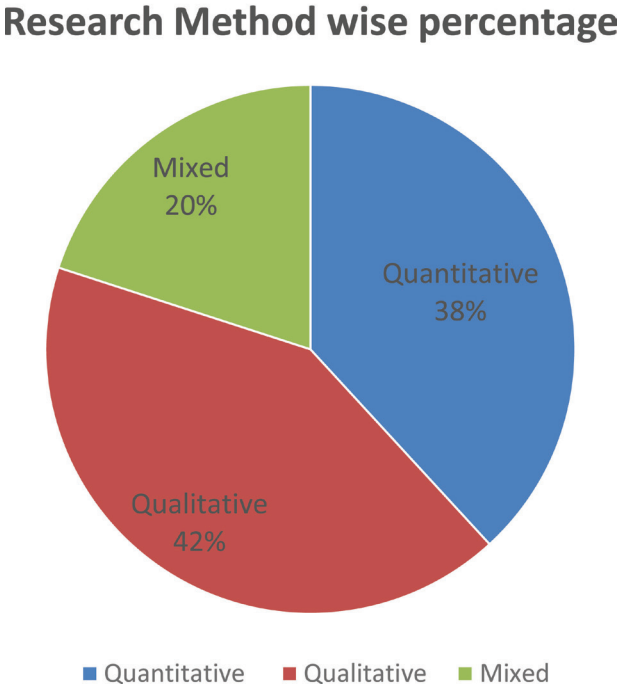

Figure 3: Research Method Wise Percentage of Included Studies

3.1.3. Country Wise Publication

Figure 4 presents a comparison of the number of publications on the perception of stakeholders towards the quality of pre-service teacher education from 2000 to 2025. The data suggest that research output is unevenly distributed among the countries. The USA stands out as the country with the most publications (10), followed by India and Turkey (6). This could indicate a higher level of engagement with the subject matter or a greater number of researchers in these countries focusing on this area. There is a representation of both developed countries (like the UK, USA, Germany, South Korea, New Zealand, UAE, and the Netherlands) and developing countries (like Malaysia, Vietnam, South Africa, Spain, Turkey, Greece, Slovenia, India, Ireland, Portugal, Bangladesh, Australia, Abu Dhabi, Ghana, Ethiopia, Nigeria, Finland, Iran, Colombia, Georgia, Kuwait, and Abu Dhabi). However, developed countries do not necessarily dominate in publication numbers, which could imply a global interest in the subject matter that transcends economic status.

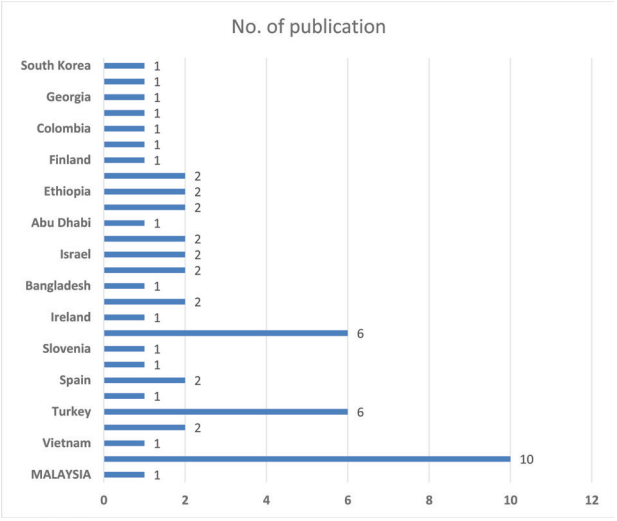

Figure 4: Country Wise Publication from 2000 to 2025 Years

3.1.4. Country Wise Average Citation

Table 3: Country Wise Average Citation per Article

Country	No. of Publication	Citation	Average Citation per Article
Malaysia	1	1	1
USA	10	780	78
Vietnam	1	2	2
South Africa	2	59	29.5
Turkey	6	365	30

Netherlands	1	4	30.95
Spain	2	6	31.9
Greece	1	71	32.85
Slovenia	1	25	33.8
India	6	16	34.75
Ireland	1	2	35.7
Portugal	2	78	36.65
Bangladesh	1	350	37.6
Australia	2	274	38.55
Israel	2	41	39.5
New Zealand	2	339	40.45
Abu Dhabi	1	95	41.4
Ghana	2	92	42.35
Ethiopia	2	52	43.3
Nigeria	2	4	44.25
Finland	1	13	45.2
Iran	1	8	46.15
Colombia	1	1	47.1
UAE	1	20	48.05
Georgia	1	670	49
Kuwait	1	15	49.95
South Korea	1	82	50.9

Table 3 reports the average citation score per research article, providing a comparison to assess the impact and prominence of research articles on stakeholders' perceptions of the quality of pre-service teacher education from 2000 to 2025 from around the world. The USA had the highest average citation score per research article at 78. The next highest scores were for South Korea (50.9), Kuwait (49.95), Georgia (49), UAE (48.05), Colombia (47.1), Iran (46.15), Finland (45.2), and Nigeria (44.25); all of which demonstrate impactful research contributions with another strong average citation score.

Overall, these countries have produced impactful research articles that have been cited and received well in the academic community. Although Ethiopia had a lower average citation score at 43.5 compared to South Korea, Kuwait, Georgia, the UAE, Colombia, Iran, Finland, and Nigeria, their research contributions have exhibited their level of engagement in pre-service teacher education-related research publications. The number of publications combined with an average citation score indicates Ethiopia engaged a broad audience with productive contributions across a range of perspectives, provides more options for stakeholders in the ego supply chain research domain, and provides various ethical considerations. India, Ireland, Portugal, Bangladesh, New Zealand, Abu Dhabi, and Ghana show a consistent level of engagement and impact in pre-service teacher education research, with average citation scores of 34.75, 35.7, 36.65, 37.6, 38.55, 39.5, 40.45, 41.4, and 42.35, respectively. Countries such as Slovenia, Greece, Spain, the Netherlands, Turkey, South Africa, Vietnam, and Malaysia have lower average citation scores, ranging from 33.8 down to 1. This could reflect emerging research areas within these countries and smaller academic communities engaged in pre-service teacher education research.

3.2. Perception Stakeholders towards Technological Intervention

Authors & Year	Major Findings
Hu & Sperling (2022)	Pre-service teachers perceived educational and COTS games as equally effective, preferred using games after formal instruction, and identified limited time as a major barrier to implementation.
De la Hoz *et al.* (2024)	Participation in robotics-based learning significantly improved self-confidence and perceptions of robotics' effectiveness in teaching STEM subjects.

Authors & Year	Major Findings
Badilla Quintana *et al.* (2017)	Virtual Learning Environments (VLEs) improved technology skills and pedagogical competence. Pre-service teachers positively assessed the effectiveness of VLEs but faced technical issues such as hardware and connectivity problems.
Aslan & Zhu (2015)	ICT courses provided foundational knowledge, but implementation in teaching practice was limited due to insufficient training and infrastructure.
Sanusi *et al.* (2024)	Basic AI knowledge and social influence significantly impacted pre-service teachers' intention to learn AI, while self-efficacy and perceived relevance had weaker effects.
Agarwal (2024)	No significant gender differences were found in ICT knowledge and practice.

Technology plays a crucial role in shaping pre-service teachers' educational experiences, influencing their perceptions, confidence, and teaching practices. While digital tools such as academic and commercial off-the-shelf (COTS) games, robotics-based learning, and virtual learning environments (VLEs) enhance pedagogical competence and technology skills, challenges like limited time, technical difficulties, and inadequate infrastructure hinder seamless integration (Hu & Sperling, 2022; De la Hoz *et al.*, 2024; Badilla Quintana *et al.*, 2017). ICT courses lay the foundation for technological proficiency, yet gaps in practical implementation persist (Aslan & Zhu, 2015). Additionally, while basic AI knowledge and social influence drive interest in AI learning, self-efficacy and perceived relevance have a lesser impact (Sanusi *et al.*, 2024). Notably, gender does not significantly affect ICT knowledge or its application in teaching, highlighting an equitable learning landscape in this domain (Agarwal, 2024).

3.3. Perception Stakeholders towards Challenges

Authors & Year	Major Findings
Karsli & Yagiz (2022)	Internship was beneficial for professional development and mentorship, but challenges included insufficient duration, limited mentorship, and organizational issues.
Ozdas (2018)	Participants gained confidence and pedagogical skills, but faced challenges such as ineffective mentorship, lack of materials, and poor classroom management by mentor teachers.
Smit *et al.* (2024)	Student participation in research was crucial for fostering collaboration, but pre-service teachers required more structured guidance and preparation.
Badilla Quintana *et al.* (2017)	Virtual Learning Environments (VLEs) improved technology skills and pedagogical competence. Pre-service teachers positively assessed their effectiveness but faced technical difficulties such as hardware and connectivity issues.
Kesner *et al.* (2016)	African American participants were more accepting of corporal punishment, while Asian participants rated disciplinary actions as less abusive.
Young & Lewis (2008)	Significant gender-based differences were found, with female students rating student-teacher interaction more positively.
Koca & Sen (2006)	Many pre-service teachers initially viewed teacher-centered environments as effective. However, those supporting student-centered approaches faced challenges due to their prior learning experiences.
Adhikary (2017)	Mixed reactions emerged: some trainees valued the extended duration for in-depth training, while others found it challenging due to additional workload and financial constraints.
Hourani (2013)	Participants faced multiple constraints, including language barriers, lack of reflection skills, and insufficient institutional support.
Aslan & Zhu (2015)	ICT courses provided foundational knowledge, but implementation in teaching practice was limited due to insufficient training and infrastructure.
Desta (2019)	Many educators understood the concept of differentiated instruction but lacked the necessary training and resources to implement it effectively.
Khalid (2017)	Participants felt confident in pedagogical knowledge and classroom management but lacked exposure to technology integration and assessment practices.

Authors & Year	Major Findings
Windfont (2024)	Teachers were willing to integrate technology but faced barriers such as limited training and inadequate school infrastructure.
Agyei & Benning (2015)	GeoGebra enhanced teachers' mathematical understanding and instructional strategies, but lack of prior exposure and time constraints hindered adoption.
Singh & Mohalik (2022)	Values such as empathy, fairness, and inclusivity were widely recognized. However, practical implementation in classrooms remained a challenge due to limited training opportunities.
Yin (2019)	University coursework provided fundamental knowledge but did not sufficiently prepare student teachers for the complexities of classroom practice.
Zhang (2010)	Participants were hesitant to disclose personal perspectives due to concerns about student disagreements, misunderstandings, and potential conflicts with parents and administration.

The internship experience played a vital role in shaping the professional growth of pre-service teachers, offering them valuable mentorship opportunities and hands-on classroom exposure. However, several challenges emerged, including insufficient internship duration, limited mentorship support, and organizational difficulties. While participants gained confidence and enhanced their pedagogical skills, they encountered obstacles such as ineffective mentorship, inadequate teaching materials, and poor classroom management by mentor teachers. Student participation in research fostered collaboration and deeper engagement, yet pre-service teachers required more structured guidance and preparation to maximize their learning (Karsli & Yagiz, 2022; Ozdas, 2018; Smit *et al.*, 2024).

Virtual Learning Environments (VLEs) proved beneficial in enhancing technology skills and pedagogical competence, with pre-service teachers generally viewing them as effective, despite facing technical challenges such as hardware limitations and connectivity issues. Additionally, cultural and gender-based differences influenced perceptions of discipline and student-teacher interactions, with African American participants showing greater acceptance of corporal punishment and Asian participants perceiving disciplinary actions as less abusive. Gender differences were also evident, as female students rated student-teacher interactions more positively (Badilla Quintana *et al.*, 2017; Kesner *et al.*, 2016; Young & Lewis, 2008). Furthermore, while many pre-service teachers initially favored teacher-centered instructional methods, those advocating for student-centered approaches struggled with implementation due to their prior educational experiences (Koca & Sen, 2006).

The internship experience elicited mixed reactions among trainees, with some appreciating the extended duration for in-depth training, while others found it challenging due to the added workload and financial constraints (Adhikary, 2017). Participants also faced multiple barriers, including language difficulties, limited reflection skills, and insufficient institutional support, which hindered their overall development (Hourani, 2013). While ICT courses provided foundational knowledge, their practical implementation in teaching was constrained by inadequate training and limited infrastructure (Aslan & Zhu, 2015). Many educators understood the importance of differentiated instruction but struggled with its execution due to insufficient training and resources (Desta, 2019). Despite feeling confident in pedagogical knowledge and classroom management, participants lacked adequate exposure to technology integration and assessment practices (Khalid, 2017).

Teachers demonstrated a willingness to incorporate technology into their teaching, yet they encountered significant obstacles such as limited training and poor school infrastructure (Windfont, 2024). In mathematics education, tools like GeoGebra enhanced teachers' understanding and instructional strategies; however, a lack of prior exposure and time constraints limited their adoption (Agyei & Benning, 2015). Core values such as empathy, fairness, and inclusivity were widely acknowledged, yet their practical application in classroom settings remained challenging due to limited training opportunities (Singh & Mohalik, 2022). While university coursework provided essential theoretical knowledge, it did not sufficiently equip student teachers to handle the complexities of real-world classrooms. Additionally, findings revealed that participants were often hesitant to express personal perspectives due to concerns about student disagreements, misunderstandings, and potential conflicts with parents and administration (Yin, 2019; Zhang, 2010).

3.4. Perception Stakeholders towards Factors Influencing

Authors & Year	Major Findings
Nizar et al. (2024)	Facilitating conditions significantly shaped positive attitudes and influenced pre-service teachers' intention to continue using MAR. Performance expectancy played a key role in acceptance.
Gumbi et al. (2024)	Results, analyzed using structural equation modeling, showed that DGBL was perceived as engaging and effective for learning but required further empirical validation.
Puerta (2024)	Gamification was viewed positively for student motivation but required appropriate training and contextual adaptation to be effective.
Hu & Sperling (2022)	Pre-service teachers perceived educational and COTS games as equally effective, pre-ferred using games after formal instruction, and identified limited time as a major barrier to implementation.
Ahsan et al. (2012)	Factors such as length of training, gender, interaction with persons with disabilities, and knowledge of local legislation influenced perceived teaching efficacy.
Akanzire et al. (2025)	Pre-service teachers had generally positive perceptions of GenAI's potential for en-hancing learning and engagement, but concerns were raised regarding ethical implica-tions and assessment fairness.
Amorim & Ribeiro-Silva (2024)	Socialization processes significantly influenced teachers' professional development, with variations in mentoring styles.
Ijioma et al. (2014)	Educators perceived the concurrent model as having a more positive influence on student teachers' mastery of subject matter, teaching skills, and classroom management.
Hilden et al. (2022)	Student teachers valued summative assessment practices that emphasized communication and curricular alignment. They felt most competent in using traditional assessment methods but were less confident in evaluating oral skills and process-based assessments.
Sanusi et al. (2024)	Basic AI knowledge and social influence significantly impacted pre-service teachers' intention to learn AI. However, self-efficacy and perceived relevance had weaker effects.
Hernandez-Ocampo et al. (2024)	Many pre-service teachers associated assessment primarily with testing, often viewing it as subjective and anxiety-inducing. However, others recognized its benefits, particularly in providing feedback for learning improvement.
Salimi & Rad (2024)	Themes identified included eliminating race, gender, and class-related inequalities, fostering positive thinking, and integrating multicultural content.
Reynolds et al. (2016)	Additional hours improved confidence in classroom management, student engagement, and professional knowledge, but did not significantly impact content delivery and as-sessment skills.
Khalid (2017)	Participants felt confident in pedagogical knowledge and classroom management but lacked exposure to technology integration and assessment practices.
Minor (2002)	Seven major characteristics of effective teachers were identified: student-centeredness, classroom management skills, instructional competence, ethical behavior, enthusiasm, subject knowledge, and professionalism.
Fajet et al. (2005)	Prior schooling experiences strongly influenced pre-service teachers' beliefs about teaching, which were resistant to change.
Filiz & Durnali (2019)	Content analysis revealed participants found practical training beneficial but criticized theoretical coursework for being repetitive and unengaging. Major concerns included the short program duration, crowded classes, and lack of engaging instructors.
Singh & Mohalik (2022)	Values such as empathy, fairness, and inclusivity were widely recognized. However, practical implementation of these values in classroom settings remained challenging due to limited training opportunities.
Swain et al. (2024)	No significant gender differences in NOS understanding were found, with both male and female participants demonstrating similar levels of comprehension.

Facilitating conditions played a crucial role in shaping positive attitudes among pre-service teachers and influenced their intention to continue using Mobile Augmented Reality (MAR), with performance expectancy emerging as a key factor in its acceptance (Nizar *et al.*, 2024). Structural equation modeling

results showed that Digital Game-Based Learning (DGBL) was perceived as engaging and effective for learning, though further empirical validation was required (Gumbi *et al.*, 2024). Gamification was generally seen as beneficial for enhancing student motivation but depended on appropriate training and contextual adaptation for effectiveness (Puerta, 2024). Similarly, pre-service teachers perceived both educational and commercial off-the-shelf (COTS) games as equally effective, though they preferred integrating games after formal instruction, with limited time identified as a major barrier to implementation (Hu & Sperling, 2022).

Several factors—including training duration, gender, interaction with individuals with disabilities, and knowledge of local legislation—were found to influence perceived teaching efficacy (Ahsan *et al.*, 2012). While there was a generally positive perception of Generative AI's potential to enhance learning and engagement, concerns remained regarding its ethical implications and fairness in assessment (Akanzire *et al.*, 2025). Socialization processes were also shown to significantly influence teachers' professional development, with notable variations in mentoring styles (Amorim & Ribeiro-Silva, 2024). Educators perceived the concurrent model as particularly effective in strengthening student teachers' mastery of subject matter, teaching skills, and classroom management (Ijioma *et al.*, 2014). Furthermore, student teachers placed high value on summative assessment practices that emphasized communication and curricular alignment. While they felt most confident in using traditional assessment methods, they lacked confidence in evaluating oral skills and process-based assessments (Hilden *et al.*, 2022).

In the context of artificial intelligence, knowledge and social influence played a significant role in shaping pre-service teachers' intention to learn AI, though self-efficacy and perceived relevance had weaker effects (Sanusi *et al.*, 2024). Many pre-service teachers primarily associated assessment with testing, often perceiving it as subjective and anxiety-inducing, though some recognized its benefits in providing constructive feedback for learning improvement (Hernandez-Ocampo *et al.*, 2024). Teacher development was also shaped by key themes such as eliminating race, gender, and class-related inequalities, fostering positive thinking, and integrating multicultural content into curricula (Salimi & Rad, 2024). Additional training hours improved confidence in classroom management, student engagement, and professional knowledge, but had little effect on content delivery and assessment skills (Reynolds *et al.*, 2016).

While participants generally felt assured in their pedagogical knowledge and classroom management abilities, they reported limited exposure to technology integration and effective assessment practices (Khalid, 2017). Seven characteristics were identified as defining effective teachers: student-centered approaches, classroom management skills, instructional competence, ethical behavior, enthusiasm, subject knowledge, and professionalism (Minor, 2002). Prior schooling experiences also strongly shaped pre-service teachers' beliefs about teaching, making them resistant to change (Fajet *et al.*, 2005). Content analysis revealed that practical training was highly valued, but theoretical coursework was often criticized for being repetitive and unengaging, with additional concerns about short program duration, overcrowded classes, and a lack of engaging instructors (Filiz & Durnali, 2019). Furthermore, while values such as empathy, fairness, and inclusivity were widely recognized, their practical application in classroom settings remained challenging due to limited training opportunities (Singh & Mohalik, 2022). Finally, no significant gender differences were found in understanding the Nature of Science (NOS), as both male and female participants demonstrated similar levels of comprehension (Swain *et al.*, 2024).

3.5. Perception Stakeholders towards Pedagogical Practices

Authors & Year	Major Findings
Freeman & Lee (2024)	Findings indicated that Mixed Reality Situations (MRS) improved pedagogical skills, served as an effective training resource, and required technological improvements for greater real-ism. The study emphasized the need for multiple MRS sessions to enhance pre-service teachers' confidence in classroom management and instruction.
Gill et al. (2009)	Students were initially supportive of inclusion, but their attitudes became more negative over time, though they continued to value social integration.

Authors & Year	Major Findings
Nguyen et al. (2024)	Method courses improved teachers' conceptual understanding and application of STEM pedagogical models, though challenges in implementation persisted.
Ozdas (2018)	Participants gained confidence and pedagogical skills but also faced challenges such as ineffective mentorship, lack of materials, and poor classroom management by mentor teachers.
Hu & Sperling (2022)	Pre-service teachers perceived educational and COTS games as equally effective, preferred using games after formal instruction, and identified limited time as a major barrier to im-plementation.
Smit et al. (2024)	Student participation in research was crucial for fostering collaboration, but pre-service teachers required more structured guidance and preparation.
De la Hoz et al. (2024)	Participation in robotics-based learning significantly improved self-confidence and percep-tions of robotics' effectiveness in teaching STEM subjects.
Badilla Quintana et al. (2017)	Pre-service teachers positively assessed the effectiveness of Virtual Learning Environments (VLEs) but faced technical difficulties such as hardware and connectivity issues.
Avsec & Savec (2021)	Transformative learning required critical reflection, self-awareness, and social support, with self-directed learning emerging as a key factor in effective Education for Sustainable De-velopment (ESD) implementation.
Kesner et al. (2016)	African American participants were more accepting of corporal punishment, while Asian participants perceived disciplinary actions as less abusive.
Stites et al. (2018)	Pre-service teachers lacked a coherent understanding of inclusion and required additional training to feel adequately prepared.
Ahsan et al. (2012)	Length of training, gender, interaction with persons with disabilities, and knowledge of local legislation influenced perceived teaching efficacy.
Costello & Boyle (2013)	Participants initially held positive attitudes toward inclusion, but these declined over time, particularly concerning training effectiveness and perceived competence.
Barkhuizen & Feryok (2006)	Participants gained linguistic and pedagogical insights, though their expectations and expe-riences varied significantly.
Hourani (2013)	Participants faced multiple constraints, including language barriers, lack of reflection skills, and insufficient institutional support.
Ijioma et al. (2014)	Educators perceived the concurrent model as having a more positive influence on student teachers' mastery of subject matter, teaching skills, and classroom management.
Atmaca et al. (2024)	Participants demonstrated high summarizing achievement levels, a strong belief in the im-portance of summarization, and high self-efficacy in summary-based reading and writing.
Hilden et al. (2022)	Student teachers valued summative assessment practices that emphasized communication and curricular alignment. They felt most competent in traditional assessment methods but less confident in evaluating oral skills and process-based assessments.
Hernandez-Ocampo et al. (2024)	Many pre-service teachers associated assessment primarily with testing, often viewing it as subjective and anxiety-inducing.
Kamil (2011)	Participants had limited exposure to process-based writing instruction, and teaching practices did not align with modern pedagogical approaches.
Agyei & Benning (2015)	GeoGebra enhanced teachers' mathematical understanding and instructional strategies, but a lack of prior exposure and time constraints hindered its adoption.
Filiz & Durnali (2019)	Content analysis revealed that participants found practical training beneficial but criticized theoretical coursework as repetitive and unengaging. Major concerns included short program duration, overcrowded classes, and a lack of engaging instructors.

Mixed Reality Situations (MRS) proved to be an effective training resource that enhanced pedagogical skills and classroom management, though technological improvements were needed to increase realism. The study highlighted the importance of multiple MRS sessions to further build pre-service teachers' confidence in instruction (Freeman & Lee, 2024). While students initially supported inclusive

education, their attitudes became more negative over time, though they continued to value social integration (Gill *et al.*, 2009). Method courses contributed to a better conceptual understanding and application of STEM pedagogical models, though challenges in real-world implementation persisted (Nguyen *et al.*, 2024). Pre-service teachers gained confidence and pedagogical skills but faced obstacles such as ineffective mentorship, a lack of materials, and poor classroom management by mentor teachers (Ozdas, 2018). Educational and commercial off-the-shelf (COTS) games were perceived as equally effective, with a preference for using them after formal instruction, though limited time remained a major implementation barrier (Hu & Sperling, 2022). Student participation in research played a crucial role in fostering collaboration, yet pre-service teachers required more structured guidance and preparation (Smit *et al.*, 2024). Engagement in robotics-based learning significantly boosted self-confidence and reinforced perceptions of robotics as an effective tool for STEM education (De la Hoz *et al.*, 2024). Pre-service teachers positively evaluated the role of Virtual Learning Environments (VLEs) in improving pedagogical competence but encountered technical challenges such as hardware limitations and connectivity issues (Badilla Quintana *et al.*, 2017). Transformative learning was found to require critical reflection, self-awareness, and social support, with self-directed learning emerging as a key factor in the effective implementation of Education for Sustainable Development (ESD) (Avsec & Savec, 2021).

African American participants were more accepting of corporal punishment, while Asian participants perceived disciplinary actions as less abusive (Kesner *et al.*, 2016). Pre-service teachers often lacked a coherent understanding of inclusion and required additional training to feel adequately prepared (Stites *et al.*, 2018). Factors such as training length, gender, interactions with individuals with disabilities, and knowledge of local legislation influenced their perceived teaching efficacy (Ahsan *et al.*, 2012). While participants initially held positive attitudes toward inclusion, these attitudes declined over time, particularly regarding the effectiveness of their training and their perceived competence (Costello & Boyle, 2013). Although participants gained valuable linguistic and pedagogical insights, their expectations and experiences varied significantly (Barkhuizen & Feryok, 2006). Multiple constraints, including language barriers, a lack of reflection skills, and insufficient institutional support, further hindered their development (Hourani, 2013). Educators viewed the concurrent model as having a more positive impact on student teachers' mastery of subject matter, teaching skills, and classroom management (Ijioma *et al.*, 2014). Participants demonstrated strong summarizing skills, a high belief in the importance of summarization, and high self-efficacy in summary-based reading and writing (Atmaca *et al.*, 2024). Student teachers valued summative assessment practices that emphasized communication and curricular alignment, feeling most competent in traditional assessment methods but less confident in evaluating oral skills and process-based assessments (Hilden *et al.*, 2022). Many pre-service teachers primarily associated assessment with testing, often perceiving it as subjective and anxiety-inducing (Hernandez-Ocampo *et al.*, 2024). Additionally, participants had limited exposure to process-based writing instruction, with teaching practices that did not fully align with modern pedagogical approaches (Kamil, 2011). In mathematics education, GeoGebra enhanced teachers' mathematical understanding and instructional strategies; however, a lack of prior exposure and time constraints hindered its adoption (Agyei & Benning, 2015). Content analysis revealed that while participants found practical training beneficial, they criticized theoretical coursework for being repetitive and unengaging, citing concerns such as short program duration, overcrowded classes, and a lack of engaging instructors (Filiz & Durnali, 2019).

3.6. Perception of Stakeholders towards Professional Development

Author's Name and Year	Major Findings
Karsli & Yagiz (2022)	The internship was beneficial for professional development and mentorship but faced challenges such as insufficient duration, limited mentorship, and organizational issues.
Li (2020)	Multimodal practices facilitated content learning, professional development, and digital literacy.
McGarr (2024)	Digital distraction was perceived as both a sign of disrespect and an unconscious habit.

Ezer *et al.* (2010)	Participants viewed teaching as a profession offering intrinsic rewards and self-realization.
Choy *et al.* (2014)	Significant variations in perceptions across different practicum experiences highlight the need for a more structured approach to bridging theory and practice in teacher education programs.
Paleeri (2017)	Strong preference for integrating value education based on native cultural principles, with over 80% of respondents supporting such an approach.
Amorim & Ribeiro-Silva (2024)	Socialization processes significantly influenced teachers' professional development, with variations in mentoring styles.
Atmaca *et al.* (2024)	Participants had high summarizing achievement levels, a strong belief in the importance of summarization, and high self-efficacy in summary-based reading and writing.
Grobgeld *et al.* (2016)	Faculty roles fall into four domains: organizational membership, research, teaching, and personal engagement.
Minor (2002)	Seven major characteristics of effective teachers were identified: student-centered approaches, classroom management skills, instructional competence, ethical behavior, enthusiasm, subject knowledge, and professionalism.
Dejene *et al.* (2018)	Pre-service teachers entered the program with traditional views of teaching as knowledge transmission.

The internship played a crucial role in professional development and mentorship, yet challenges such as insufficient duration, limited mentorship, and organizational issues hindered its full potential (Karsli & Yagiz, 2022). Multimodal practices were instrumental in facilitating content learning, professional growth, and digital literacy among pre-service teachers (Li, 2020). However, digital distraction was perceived ambiguously—both as an unconscious habit and a sign of disrespect in academic settings (McGarr, 2024). Participants generally viewed teaching as a profession that provided intrinsic rewards and opportunities for self-realization (Ezer *et al.*, 2010). Significant variations in perceptions across different practicum experiences underscored the need for a more structured approach to bridging theory and practice in teacher education programs (Choy *et al.*, 2014). A strong preference emerged for integrating value education based on native cultural principles, with over 80% of respondents supporting such an approach (Paleeri, 2017). Socialization processes played a key role in shaping teachers' professional development, with notable differences in mentoring styles (Amorim & Ribeiro-Silva, 2024). Participants demonstrated high summarizing achievement levels, a strong belief in its importance, and high self-efficacy in summary-based reading and writing (Atmaca *et al.*, 2024). Faculty roles were categorized into four main domains: organizational membership, research, teaching, and personal engagement (Grobgeld *et al.*, 2016). Seven key characteristics defined effective teachers: student-centered approaches, classroom management skills, instructional competence, ethical behavior, enthusiasm, subject knowledge, and professionalism (Minor, 2002). Notably, pre-service teachers entered the program with a traditional view of teaching as a process of knowledge transmission, highlighting the challenge of shifting toward more interactive and student-centered pedagogies (Dejene *et al.*, 2018).

4. Educational Implications

The findings of this systematic review underscore the multifaceted nature of stakeholder perceptions regarding the quality of pre-service teacher education programs across global contexts. Several key educational implications emerge that can inform policy, curriculum design, and teacher preparation practices:

- **Enhancing Methodological Rigor and Diversity:** The predominance of qualitative methods and the relative underuse of mixed-methods approaches highlight the need for more integrated research designs that capture both the depth and breadth of stakeholder perceptions. Educational researchers and institutions should be encouraged to adopt diverse methodological frameworks to yield comprehensive insights and facilitate comparative studies across contexts.
- **Equitable Global Representation and Knowledge Exchange:** The uneven distribution of publications and citation impacts across countries points to the need for fostering international collaboration and capacity-building efforts, particularly in underrepresented regions. Policymakers and research institutions should invest in creating platforms for cross-national dialogues to ensure that diverse voices contribute to the global discourse on teacher education quality.

- **Technological Integration and Pedagogical Innovation:** While stakeholders acknowledged the potential of digital tools and platforms, gaps in infrastructure, training, and practical implementation persist. Teacher education programs must prioritize the integration of digital literacy, AI competencies, and gamified learning within their curricula, supported by continuous professional development and investment in technological infrastructure.
- **Responsive Curriculum and Inclusive Practices:** Challenges related to mentorship, cultural diversity, inclusion, and differentiated instruction suggest a pressing need for curricula that are contextually responsive and inclusive. Embedding multicultural education, empathy, fairness, and reflective practices into pre-service training can bridge the theory-practice gap and enhance teacher preparedness for diverse classroom realities.
- **Strengthening Assessment and Reflective Practices:** Stakeholders' limited confidence in process-based and formative assessment points to a gap in training and understanding. Educator preparation programs should place greater emphasis on authentic assessment, feedback mechanisms, and the development of reflective practice to support meaningful learning and professional growth.
- **Sustained Professional Development and Socialization:** The significant role of socialization, practicum experiences, and value-based mentoring in shaping professional identity calls for more structured and sustained engagement between universities and schools. Strengthening the linkage between coursework and field experiences can foster the holistic development of pre-service teachers.

5. Conclusion

This systematic review synthesized 55 studies conducted between 2000 and 2025 to explore stakeholder perceptions of the quality of pre-service teacher education programs globally. The findings revealed significant variability in research trends, methodological approaches, country-wise contributions, and thematic focus areas such as technological integration, pedagogical practices, professional development, and influencing factors. Stakeholders generally recognized the value of emerging technologies, inclusive pedagogies, and reflective practices but also expressed concerns regarding infrastructure limitations, inadequate training, and the disconnect between theoretical knowledge and classroom realities. Additionally, the influence of cultural, social, and institutional contexts emerged as a critical determinant of how pre-service teacher education is perceived and enacted.

The review highlights the urgent need for evidence-informed reforms in teacher education that prioritize contextual relevance, technological fluency, and sustained mentorship. It calls upon researchers, policymakers, and educators to collaboratively build adaptive, inclusive, and forward-thinking teacher education systems that respond to the dynamic needs of 21st-century learners and societies.

Future research should explore the longitudinal impacts of pre-service training, particularly the role of emerging technologies like AI and Mixed Reality in shaping instructional practices. A more equitable global research landscape must also be fostered to amplify diverse educational experiences and perspectives.

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Authorship Contribution

Rajshree Das: Conceptualized the study, developed the research questions, guided the overall design and methodology of the systematic review, conducted the literature search, supervised the review process, and verified the accuracy of extracted data. **Gouranga Charan Nanda:** Reviewed abstracts, defined inclusion and exclusion criteria, edited the manuscript for clarity and coherence, and played a key role in refining the study selection process. **Sarat Kumar Rout:** Acted as an independent peer reviewer, used RAYYAN software for screening and validation, analyzed and interpreted the reviewed studies, and enhanced content accuracy. **Laxmidhar Muduli:** Served as an independent peer reviewer, collaborated with Dr. Rout in screening

studies, developed visual representations such as figures, and contributed to data interpretation and presentation. **Bikshyatsib Sardar:** Supported the team as an independent reviewer, participated in study selection using RAYYAN software, and assisted in proofreading and data analysis, ensuring consistency and accuracy throughout the manuscript.

Collectively, all authors collaborated to ensure the rigor, clarity, and comprehensiveness of this systematic review.

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Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Declarations

The authors declare that this work is original, has not been published or submitted elsewhere, and adheres to ethical research standards. All authors significantly contributed to the research and preparation of the manuscript, approved the final version, and confirm that there are no conflicts of interest. Proper acknowledgment has been given to all sources and support.

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