Journal of Workplace Behavior (JWB)
Volume 5, Issue 1 (2024)
ISSN (E): 2710-2378
ISSN (P): 2710-2807
https://charisma-jwb.com/index.php/jwb

Title:	Designing and Validating a Tool for Measuring Teachers' Perception: A Methodological Contribution to Performance Based Teacher's Licensing Framework Development
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History:	Received: May 03, 2025 Revised: June 09, 2025 Accepted: June 11, 2025 Published: June 30, 2025
Citation:	Kamal, B.M., and Saadi, A.M. (2025), Designing and Validating a Tool for Measuring Teachers' Perception: A Methodological Contribution to Performance Based Teacher's Licensing Framework Development, Journal of Workplace Behavior, 6(1), 106-125.
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JEL Classification:	I280 and M12
Copyright:	© The Authors
Conflict of Interest:	The authors have no conflicts of interest to declare.
Funding:	The research is not supported from any source.
Ethical Consideration:	- Written permission was obtained for the scales used in the study. - Ethics committee approval was obtained from the Institutional Ethical Board - Informed consent was obtained from all subjects involved in the study.

Designing and Validating a Tool for Measuring Teachers' Perception: A Methodological Contribution to Performance Based Teacher's Licensing Framework Development

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Abstract
Teacher licensing is recognized as a mechanism for improving the quality of education by ensuring accountability, professionalism, and continuous teacher development. However, in Pakistan, no standardized licensing system currently exists nation-wide. A validated instrument to measure teacher performance for licensing purposes has been lacking. This study aimed to develop and validate a tool to measure perception of teachers about performance-based evaluation that could inform the development of a framework for initiating a teacher licensing system. Guided by theoretical frameworks of Messick and DeVellis, the tool was designed through an extensive literature review and expert consultation, followed by assessment of content validity using the Content Validity Index (CVI). Expert feedback led to the removal of redundant items, revision of unclear items, and addition of contextually relevant items. The revised tool was pilot-tested with 100 elementary school teachers (Urban Boys and Girls, Rural Boys and Girls), yielding a 53% response rate, which is considered acceptable for pilot validation studies. Reliability testing using Cronbach's alpha confirmed acceptable internal consistency, while Principal Component Analysis (PCA) established construct validity. The five-factor structure explained 67.4% of the total variance, capturing constructs of perceptions of licensing, performance aspects, role of management, anticipated challenges in implementation, and recommendations for successful adoption. The findings validate a statistically robust and contextually grounded tool that can serve as a foundation for developing a licensing framework in Pakistan. This contributes to the broader discourse on teacher accountability and quality enhancement, offering policymakers a reliable instrument to initiate evidence-based teacher licensing reform.

Keywords: *Teacher's Certification, Performance-based evaluation, Key performance, indicators (KPIs), Scale Development, Pakistan*

1. Introduction

Teacher quality has long been recognized as one of the most influential factors in determining student learning outcomes and overall educational effectiveness (Darling-Hammond, 2016; Wilson, Floden, & Ferrini-Mundy, 2001; Goldhaber & Brewer, 1999). As education systems strive to meet the demands of globalization, technological change, and twenty-first-century skills, the role of teachers has expanded beyond knowledge transmission to include facilitation, innovation, and continuous professional growth (Baker, 2014; Hoyte *et al.*, 2020). Consequently, the establishment of rigorous standards for teacher preparation, licensing, and evaluation has emerged as a cornerstone of educational reforms worldwide (Darling-Hammond, 2019; Khan & Ahmad, 2021).

Teacher licensing systems are increasingly viewed as mechanisms for ensuring accountability, elevating professional standards, and safeguarding educational quality (Wise, 1994; Youngs,

Odden, & Porter, 2003). Teacher licensing not only certifies minimum competency but also represents a broader shift toward recognizing teaching as a profession on par with law and medicine (Darling-Hammond, 2000; Ghamrawi, Abu-Tineh, & Shal, 2023). Across regions such as the United States, Europe, the Middle East, and Asia, licensure policies have been closely associated with teacher professionalism, effectiveness, and the wider agenda of professionalization (Abdallah & Musah, 2021; Baris & Hasan, 2019; Nurhattati, Buchdadi, & Yusuf, 2020). Despite this global momentum toward standardized licensing frameworks, research highlights ongoing concerns about their actual impact on teaching quality and student achievement (Ballou & Podgursky, 2000; Kamal, Kayani, & Bajwa, 2024).Critics contend that licensing exams and certification processes often emphasize compliance over meaningful professional growth, thereby creating obstacles to teacher supply and workforce diversity (Van Cleve, 2020; Faseel & Siddiqui, 2025). Moreover, questions remain about the extent to which these policies align with authentic classroom practice and tangible student outcomes (Tomasik, 2022; Chung & Zou, 2021).

In response to these critiques, many education systems are shifting toward performance-based evaluation as the foundation for teacher licensing and certification. Unlike traditional one-time, paper-based examinations, performance-based models prioritize demonstrated teaching competencies in authentic contexts through structured observations, teaching portfolios, classroom artifacts, and evidence of student learning (Darling-Hammond, Newton, & Wei, 2013; Parsi & Darling-Hammond, 2015; Goldhaber & Brewer, 1999). This signals a fundamental transformation: teacher licensing is evolving from the verification of entry-level knowledge to the assessment of applied pedagogical practice and professional dispositions, benchmarked against national or international standards.

Performance-based evaluation frameworks operationalize teacher standards by creating a structured pathway from preparation to induction to ongoing professional development. For example, in the United States, the edTPA (Educative Teacher Performance Assessment)requires preservice teachers to demonstrate proficiency through lesson planning, video-recorded teaching, and reflective analysis (Peck, Young, & Zhang, 2021). Similarly, in Australia, the Australian Professional Standards for Teachers are directly linked to performance evaluations at graduate, proficient, and advanced career stages (Hanley-Maxwell & Wycoff-Horn, 2017). In the UAE, recent reforms, integration of AI and advanced technology have embedded teacher licensing within a National Professional Standards Framework, emphasizing reflective practice, innovation, and continuous improvement as licensing benchmarks (Abdallah & Awad, 2026).

By integrating licensing with performance-based evaluations, education systems seek to achieve three interconnected goals:

a. Accountability – ensuring that all licensed teachers meet minimum thresholds of effectiveness.
b. Instructional improvement – leveraging evaluation not just for summative decisions, but as a mechanism to inform coaching, mentoring, and professional learning communities (Shoemaker, 2016; Parsi & Darling-Hammond, 2015).
c. Professionalization – framing teaching as a standards-driven career with pathways for growth and specialization.

However, as cross-national evidence demonstrates, the validity, reliability, and contextual fit of these frameworks remain critical challenges. In low-resource contexts such as Pakistan and Ghana, where teacher supply and training infrastructure are uneven, adapting performance-based licensing to local realities is both necessary and difficult (Shaukat & Chowdhury, 2020; Amoah, 2020; Akhtar & Kayani, 2024). Moreover, research cautions against over-reliance on standardized rubrics or student growth measures without sufficient assessor training, cultural adaptation, and systemic support (Stiggins, 1990; Harris, 1997; Molina *et al*., 2020).

There is a pressing need in Pakistan for a comprehensive performance-based evaluation framework that can serve as the foundation of a teacher licensing system. Such a framework must be valid, reliable, and contextually appropriate, capturing both global best practices and the specific realities of Pakistan's education system.

Research shows that teachers' voices are often underrepresented in policy formulation, even though they are the primary stakeholders who both experience and enact licensing frameworks in practice (Kamal, Kayani, & Bajwa, 2024; Faseel & Siddiqui, 2025). Without understanding teacher perspectives, reforms risk being perceived as externally imposed, compliance-oriented, or disconnected from classroom realities. While much of the policy discourse on teacher licensing is framed at the system level, its legitimacy and effectiveness ultimately depend on teacher perceptions and professional buy-in (Hoyte *et al*., 2020; Van Cleve, 2020).

This study proposes the formulation of a data collection tool designed to capture teachers' perceptions about licensing systems and their alignment with performance-based evaluation frameworks. Validate this tool through multiple stages, including expert validation, content validity indexing (CVI), pilot testing, reliability testing, and principal component analysis (PCA). The resulting framework provides an evidence-based foundation for designing a teacher licensing system in Pakistan. By integrating both local realities and international best practices, the framework seeks to provide a structured, reliable, and policy-oriented tool for teacher licensing.

2. Conceptual Framework for measuring Performance-Based Teachers Licensing

The tool is formulated on five constructs.

2.1 Perceptions and awareness about Licensing

The first construct, *Perceptions and awareness about Licensing*, highlighted teachers' recognition of licensing as a mechanism for enhancing professional accountability, improving teaching quality, and elevating the credibility of the profession. This aligns with existing research (Darling-Hammond, 2017; OECD, 2015) emphasizing that licensing is not only a regulatory mechanism but also a professional motivator. Studies assesses teachers' familiarity with the concept of a teacher licensing system and their perceived need for such a system in Punjab's educational context. It will help explore whether teachers believe that a licensing system can ensure the quality of education, attract and retain high-performing teachers, and identify areas for professional improvement. Additionally, it will help to evaluate the perception that licensing enhances the credibility of the teaching profession, increases accountability, and motivates teachers to improve their practices.

2.2 Performance Aspects

The second construct, *Performance Aspects*, identified core dimensions of teacher performance to be evaluated: pedagogical competence, classroom management, subject knowledge, professionalism, ethics, collaboration, and continuous professional development. These aspects correspond closely with international teacher standards, such as the Danielson Framework (2007; 2013) for Teaching and the InTASC Standards in the United States, both of which emphasize pedagogy, ethics, and student learning outcomes as central to teacher competence. Teachers are also asked to identify specific aspects of their performance that should be evaluated, including knowledge of the subject matter, instructional practices, professional knowledge, classroom management skills, pedagogical skills, student learning outcomes, professionalism, ethical conduct, continuous professional development, collaboration with colleagues, constructive feedback from management, and community and parental engagement.

Table 1. Summary of Frameworks and Models Used for Teacher's Evaluation

Framework Name	Domains	Key Areas of Focus	Purpose and Emphasis
Charlotte Danielson's Framework for Teachers	1. Planning and Preparation 2. Classroom Environment 3. Instructional strategies 4. Professional Responsibilities	• Lesson planning • Classroom management • Effective instructional strategies • Professional development and responsibilities	Teacher self-assessment, classroom observation, and professional development. Emphasize on student learning and reflective practices.
Robert Marzano's Teacher Evaluation Model	1. Instructional strategies 2. Planning 3. Reflection 4. Professionalism	• Impact on student learning and achievement • Lesson planning • Teacher self-reflection • Professional development and responsibilities	Concentrating on instructional strategies, coordinating goals with practices, and giving teachers constructive criticism.
McREL's Teacher Evaluation System: CUES Framework	1. Lesson planning 2. Classroom management 3. Student engagement 4. Assessment	• Effective lesson planning • Classroom management • Engaging students in learning • Assessment practices	Evaluating and enhancing reflective practice, the indirect focus on student learning, and the effectiveness of education in the classroom.
Stronge's Teacher Effectiveness Performance Evaluation System (TEPES)	1. Instructional strategies 2. Planning 3. Classroom environment 4. Professionalism	• Impact on student learning and achievement • Lesson planning • Classroom environment • Professional development	Focusing on teaching quality, evaluating and enhancing teacher effectiveness, and having a systematic evaluation method.

2.3 Role of Management

The third construct, *Role of Management*, confirmed that administrative support, transparency, and teacher involvement are critical in the licensing process. This finding is consistent with the UAE Teacher and Educational Leadership Standards Framework (TELSF) and Singapore's Teacher Growth Model (TGM), both of which stress the importance of leadership and collaboration in sustaining teacher quality.This section focuses on the role of management in the teachers' licensing system. It outlines management's responsibilities, such as providing clear guidelines and standards, allocating sufficient resources, offering training and support for teachers' evaluation, monitoring the effectiveness of the system, making necessary adjustments, involving teachers in both the development and implementation of the system, ensuring clear and regular communication, addressing concerns raised by teachers, and promoting transparency and fairness in the evaluation process. Building trust among teachers is also emphasized as a key role for management.

2.4 Challenges

The fourth construct, *Challenges*, identified resource limitations, resistance from stakeholders, and administrative burden as major barriers. Similar challenges have been reported in other developing contexts, where limited infrastructure and resistance from teacher unions have slowed down reform implementation (Akiba, 2013). In this section, potential challenges in implementing the licensing system identified. These challenges include financial and human resource limitations, technological constraints, resistance from various stakeholders (administrators, teachers, unions, and political entities), difficulties in establishing and ensuring fairness of evaluation criteria, communication issues, additional administrative burdens, and the overall costs and time considerations. There are also concerns about the potential negative impact on teacher recruitment and retention, as well as the increased pressure on teachers.

2.5 Suggestions for Implementation

The fifth construct, *Suggestions for Implementation*, revealed the need for professional development, financial support, public awareness, collaboration, and continuous monitoring. These strategies mirror recommendations from the OECD Teaching and Learning International Survey (TALIS), which highlights professional training, stakeholder engagement, and system transparency as enablers of successful policy adoption. Monitoring and evaluation systems should be established to track the effectiveness of the licensing approach, and continuous engagement with School associations, unions, political entities and policymakers is necessary to address concerns.

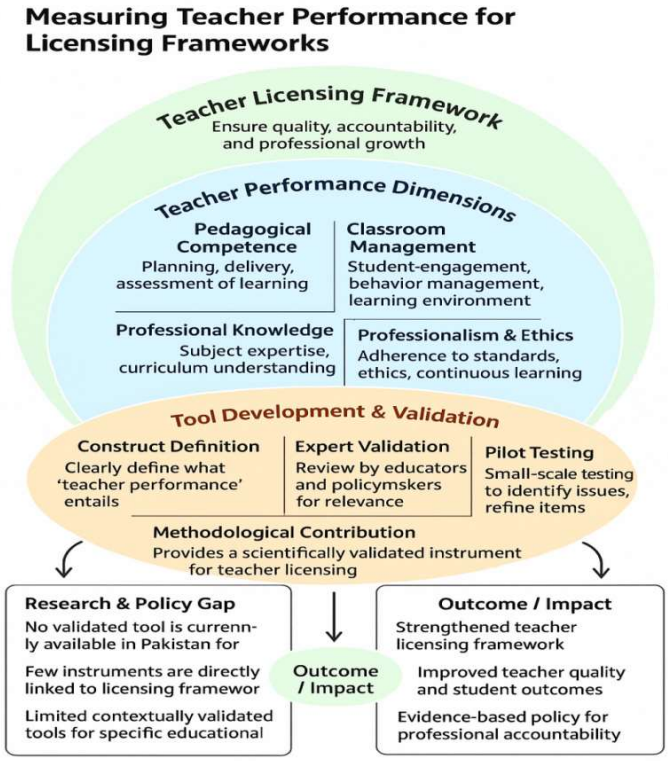

Figure 1. Conceptual Framework for Measuring Teacher Performance for Licensing system (Source: Author)

This framework provides a structured approach to understanding the various aspects and stakeholders involved in implementing a performance-based teacher licensing system in Punjab, Pakistan. The ultimate goal is to enhance the quality of education through systematic teacher evaluation and professional development.

3. Tool Validation Framework

The development and validation of educational measurement tools are guided by well-established theoretical frameworks in psycho-metrics and scale development. Messick's Unified Theory of Validity (1995) provides a comprehensive foundation by emphasizing multiple dimensions of validity within a single framework. According to this theory, validity encompasses content validity, structural validity, and reliability. Content validity is typically established through expert review and Content Validity Index (CVI) procedures, while structural validity is examined through factor analysis techniques such as Principal Component

Analysis (PCA). Reliability, often measured by Cronbach's alpha, ensures internal consistency of the instrument. Messick's framework also highlights the importance of extending validity evidence in future studies through confirmatory factor analysis (CFA) and convergent or discriminant validity testing, thereby strengthening the robustness of the instrument.
DeVellis' Scale Development Model (2016) provides an eight-step framework for systematic tool design and validation. DeVellis' model ensures that scale development remains iterative, structured, and evidence-driven.

Construct → Item generation → Expert Review → Pilot testing→ Exploratory analyses (PCA)

Reliability testing is then conducted to evaluate internal consistency, with later stages emphasizing confirmatory factor analysis to validate the structural model before finalizing the instrument. The integration of these approaches not only aligns the tool with international standards but also ensures its long-term applicability in diverse educational contexts, such as performance-based teacher evaluation for licensing systems.

3.1 Instrument Development Process

Literature Review → Draft Tool → Expert Validation → Pilot Testing
↓
Reliability & PCA (Validity Testing)
↓
Final Validated Tool

A structured, multi-stage approach was adopted, ensuring that the instrument was grounded in theory, refined through expert input, tested for practicality, and statistically validated for reliability and construct soundness.

4. Results

4.1 Item Generation

Initial questionnaire items were generated from a comprehensive literature review of international teacher licensing models (e.g., Danielson, Marzano and Stronge's TEPES). Items were aligned with National Professional Standards for Teachers.
The tool consisted of five sections:

1. Teachers' Perceptions of Licensing
2. Performance Aspects
3. Role of Management
4. Challenges in Implementation
5. Suggestions for Implementation

Each construct was operationalized into measurable items, mostly rated on a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree).

4.2 Expert Validation and Content Validity

The Content Validity Index (CVI) was employed to establish the content validity of the developed questionnaire. A panel of experts (8), including professors, head teachers, school teachers, and association members, rated each item on a 4-point relevance scale. The Item-Level CVI (I-CVI) was calculated for individual items, while the Scale-Level CVI (S-CVI/Ave = 0.957; S-CVI/UA = 0.936) confirmed strong agreement among experts. Items with low I-CVI values (0.125 and 0.25) were excluded, ensuring that only highly relevant items were retained. These results indicate that the instrument possesses strong content validity and is well-suited for evaluating teacher performance within the licensing framework (Polit & Beck, 2006).

Table 2. Content Validity Index (CVI) Results

Index Type	Description	Value Obtained	Interpretation
I-CVI	Item-level CVI for each item, proportion of experts rating 3 or 4	Low values (0.125 & 0.25) excluded	Ensured only relevant items retained
S-CVI/Ave	Average of all I-CVI values	0.957	Strong overall content validity
S-CVI/UA	Proportion of items with unanimous expert agreement	0.936	High universal agreement

4.3 Pilot Testing

The revised questionnaire was administered to a convenience sample of 100 teachers (male and female) from rural and urban schools participated in the pilot test. This sample size was sufficient for exploratory factor analysis (Principal Component Analysis, PCA) and reliability testing, following recommendations for scale validation in social sciences (Hair *et al*., 2018). A response rate of 53% was achieved. Responses were analysed to check practicality, clarity, and respondent understanding.

4.4 Reliability Testing

The reliability of the instrument was established using Cronbach's alpha, which measures internal consistency. The analysis, conducted on 70 items from the pilot test group, produced an overall Cronbach's alpha value of 0.962**,** indicating excellent reliability. Generally, a Cronbach's alpha value of ≥ 0.70 is considered acceptable**,** ≥ 0.80 good, and ≥ 0.90 excellent. Thus, the obtained score far exceeds the acceptable threshold, confirming that the items are closely related and consistently measure the intended constructs. These results ensure that the questionnaire is highly reliable for evaluating teacher performance within the proposed licensing framework.

Table 3. Reliability Statistics of Constructs

Construct	No. of Items	Cronbach's Alpha
Perceptions of Licensing	11	0.92
Performance Aspects	10	0.91
Role of Management	10	0.95
Challenges	18	0.94
Suggestions for Implementation	17	0.96
Overall Scale	66	0.96

These results confirmed that the tool had strong internal consistency across all dimensions.

4.5 Construct Validation Principal Component Analysis (PCA):

Principal Component Analysis (PCA) was applied to examine the construct validity of the developed instrument and to identify the underlying factor structure. Prior to extraction, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's Test of Sphericity were conducted to confirm the suitability of the data for factor analysis. The Kaiser-Meyer-Olkin (KMO) measure was 0.87, indicating sampling adequacy, and Bartlett's Test of Sphericity was significant (χ^2 = [value], $p < 0.001$), confirming that the data were suitable for factor analysis.

PCA was performed by retaining factors with eigenvalues greater than or equal to 1, in line with Kaiser's criterion. Five major components were extracted based on eigenvalues greater than 1 and scree plot examination, collectively explaining % of the total variance. Items with

factor loading below 0.40 were excluded. The extracted components were then analyzed to verify alignment with the theoretical framework and domains of the measuring tool. This process ensured that the instrument not only demonstrated statistical validity but also captured the multidimensional nature of teacher performance evaluation required for initiating a licensing system.

4.6 Perceptions of Teachers about TLS

PCA results for teacher perceptions extracted two components, accounting for 74.7% of the variance. The first component strongly loaded on items related to the need, quality assurance, retention, professional improvement, and accountability, suggesting that teachers largely view licensing as a mechanism to raise standards and improve professional practice. The second component emphasized the social value of teaching and credibility of the profession, highlighting perceptions that licensing can elevate teaching as a respected career.

Table 4. Descriptive Statistics (Perception of Teachers about TLS)

Items	Mean	Std. Deviation	Component 1	Component 2
Teachers are familiar with the concept of a teacher licensing system.	3.434	1.201	0.880	
There is a need for a teacher licensing system in our educational context	4.434	0.797	0.878	
A teacher licensing system may ensure the quality of education.	4.509	0.775	0.872	
Teachers licensing system can help retain high-performing teachers.	4.415	0.719	0.865	
Teachers' licensing may identify areas of improvement for teachers.	4.340	0.876	0.860	
Teachers' licensing will enhance credibility of teaching profession.	4.434	0.747	0.858	0.217
Teachers' licensing will lead to increased accountability among teachers.	4.264	0.902	0.818	-0.175
Teachers' licensing may motivate teachers to improve teaching practices.	4.396	0.884	0.814	
Teachers' licensing may contribute to the professional growth of teachers.	4.396	0.862	0.809	-0.213
Teachers' licensing will help in addressing gaps in teacher skills.	4.434	0.772	0.775	-0.24
Teachers' licensing will make the profession more valued in society.	4.415	0.842	0.209	0.927
Note. Extraction Method: Principal Component Analysis; Components Extracted (2), N = 53.				

High KMO (0.907) and significant Bartlett's Test confirmed the suitability of data for factor analysis. These results suggest that teachers perceive licensing both as a professional accountability mechanism and as a means of elevating teaching's societal status.

The scree plot (see Figure 2), showed a distinct inflection after the second component, supporting the retention of two factors. The finding aligns with the eigenvalue criterion (components with eigenvalues ≥ 1) and indicates teachers' perceptions clustered into two domains: (a) licensing as a tool for accountability and quality assurance, and (b) licensing as a mechanism for enhancing professional credibility and social value.

Table 5. Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loading		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.160	65.088	65.088	7.160	65.088	65.088
2	1.057	9.609	74.697	1.057	9.609	74.697
3	0.730	6.640	81.337			
4	0.442	4.018	85.355			
5	0.367	3.338	88.692			
6	0.345	3.135	91.828			
7	0.273	2.481	94.309			
8	0.239	2.170	96.479			
9	0.170	1.543	98.022			
10	0.117	1.065	99.087			
11	0.100	0.913	100			

Note. Extraction Method: Principal Component Analysis.

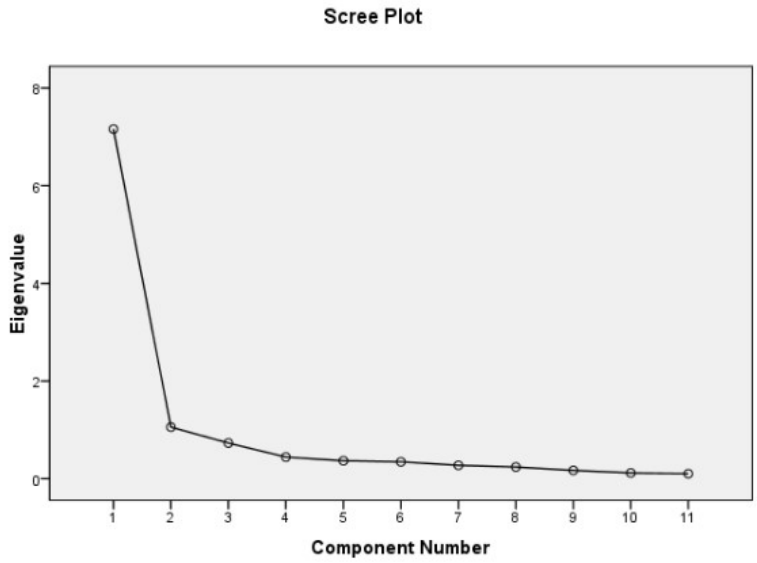

Figure 2. Perception of Teacher about TLS

4.7 Performance Aspects

For performance related aspects, PCA yielded a single dominant factor, accounted for 56.4% of the variance, with all items showing strongly above 0.70. The results indicate that teachers consider performance as a unified construct, where knowledge of subject matter, instructional practices, professional knowledge, classroom management, pedagogical skills, ethical conduct, CPD, and community engagement are interrelated dimensions of teacher performance.

Table 6. Descriptive Statistics Performance

What aspects of teacher performance should be evaluated as part of a licensing system?	Mean	Std. Deviation	Component 1
Knowledge of subject matter	4.679	0.547	0.849
Instructional Practices	4.472	0.696	0.784
Professional knowledge	4.547	0.667	0.751
Classroom management skills	4.566	0.605	0.742
Pedagogical skills	4.491	0.724	0.738
Ethical conduct	4.642	0.558	0.730
Continuous professional development	4.566	0.605	0.705
Community and parental engagement	4.509	0.669	0.701
Note. Extraction Method: Principal Component Analysis; Components Extracted (1), N=53			

KMO (0.858) and Bartlett's Test confirmed suitability. This finding reflects that in the context of licensing, teachers expect evaluation to be comprehensive, multidimensional, yet unified under a single performance construct.

Table 7. Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.516	56.450	56.450	4.516	56.450	56.450
2	0.864	10.795	67.245			
3	0.667	8.334	75.579			
4	0.594	7.430	83.010			
5	0.532	6.649	89.659			
6	0.326	4.077	93.735			
7	0.289	3.612	97.347			
8	0.212	2.653	100			
Note. Extraction Method: Principal Component Analysis.						

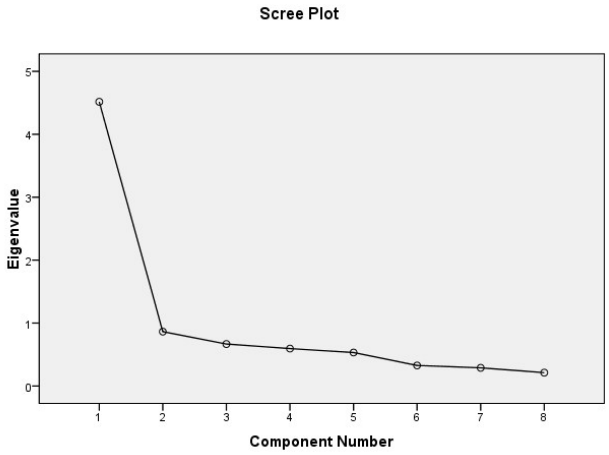

Figure 3. Performance Aspects

The scree plot *(see Figure 3), displayed a steep drop after the first component, with all subsequent eigenvalues below 1, confirming a single dominant factor solution. This supports

the interpretation that teachers view performance as a holistic construct, rather than separate unrelated dimensions.

4.8 Role of Management

The PCA extracted one dominant factor, explaining 71.9% of the variance, with strong loadings across all items. The results highlight that teachers perceive the role of management as a unified and integrated responsibility, covering resource provision, training, monitoring, evaluation, teacher involvement, addressing concerns, and promoting fairness.

Table 8. Descriptive Statistics Role of Management

Items	Mean	Std. Deviation	Component
To provide clear guidelines & standards to teachers about licensing	4.547	0.667	0.893
To provide sufficient resources (financial, human, technological)	4.491	0.724	0.891
To provide adequate training and support for teachers about teacher's evaluation for licensing	4.415	0.692	0.877
Actively monitors the effectiveness of the teachers licensing system	4.453	0.722	0.872
Actively evaluates the effectiveness of the teachers licensing system	4.396	0.768	0.868
Involves teachers in the development of the licensing system	4.359	0.787	0.864
Involves teachers in the implementation of the licensing system	4.321	0.803	0.864
Addresses concerns raised by teachers regarding the licensing system	4.472	0.696	0.817
Ensures transparency and fairness in the evaluation process	4.491	0.823	0.771
Promoting trust among teachers	4.396	0.906	0.752
Note. Extraction Method: Principal Component Analysis; N =53			

With KMO = 0.873 and Bartlett's Test significant, the factor structure was robust. This underscores that management's role is seen not as fragmented, but as a comprehensive support system crucial for the successful implementation of a licensing system.

Table 9. Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.198	71.979	71.979	7.198	71.979	71.979
2	0.680	6.803	78.782			
3	0.534	5.338	84.121			
4	0.391	3.906	88.026			
5	0.339	3.391	91.417			
6	0.268	2.679	94.096			
7	0.237	2.374	96.47			
8	0.179	1.792	98.262			
9	0.099	0.995	99.257			
10	0.074	0.743	100			
Note. Extraction Method: Principal Component Analysis.						

The scree plot (see Figure 4), demonstrated a sharp elbow after the first factor, with all other components showing minimal contribution. This validates the extraction of one strong factor and confirms that the role of management is perceived as a comprehensive, unified responsibility rather than multiple fragmented roles.

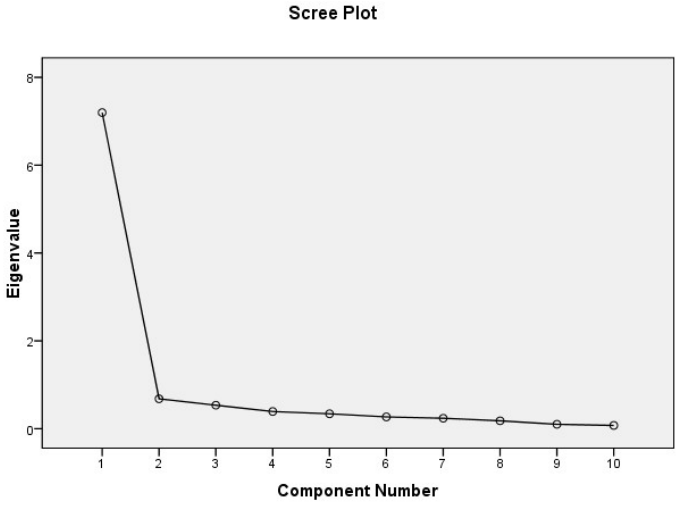

Figure 4. Role of Management

4.9 Potential Challenges

For challenges, PCA identified three components, explaining 73.2% of the variance. The first component captured resource limitations (financial, human, technological) and resistance from stakeholders. The second component represented systemic and procedural challenges, including communication gaps, fairness in evaluation, and administrative burden. The third component reflected negative consequences, such as teacher turnover, discouraging new entrants, and long-term sustainability issues.

Table 10. Descriptive Statistics Potential Challenges

Items	Mean	Std. Deviation	Component Matrix		
			1	2	3
Lack of financial resources	4.453	0.695	0.856	-0.199	
Lack of human resources (qualified personnel to administer licensing process)	4.302	0.845	0.833		
Lack of human resources (qualified personnel to oversee licensing process)	4.283	0.841	0.822		-0.175
Lack of technological resources	4.321	0.754	0.818	-0.219	-0.211
Resistance from school administrators/ management	4.189	0.878	0.817	-0.266	0.127
Resistance from school teachers	4.208	0.817	0.799	-0.260	0.160
Resistance from school association & unions	4.113	0.974	0.782	-0.250	-0.221
Resistance from political or bureaucratic entities in implementing licensing	4.094	0.925	0.776		-0.302
Resistance from cultural or societal norms	3.906	1.005	0.732	-0.178	0.422
Difficulty in establishing benchmark criteria	4.094	0.883	0.732		0.520
Lack of consensus on establishing standard criteria	4.208	0.817	0.726		0.290
Difficulty in ensuring fairness and equity in evaluation for licensing	4.151	0.770	0.725		-0.485
Lack of communicating goals of licensing to stakeholders	4.132	0.921	0.721		0.452

Additional burden on Administration/ management	4.151	0.794	0.716		-0.540
The implementation of a teacher licensing system will be expensive	4.000	0.961	0.587	0.552	0.160
The implementation of a teacher licensing system will be time-consuming	4.132	0.900	0.535	0.425	
May discourage talented individuals from entering the teaching profession	4.038	1.037	0.550	0.757	
May lead to increased teacher turnover and exacerbate teacher shortages	4.038	0.999	0.587	0.684	
Note. Extraction Method: Principal Component Analysis; N = 53					

Table 11. Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	9.726	54.031	54.031	9.726	54.031	54.031
2	1.878	10.435	64.466	1.878	10.435	64.466
3	1.564	8.69	73.156	1.564	8.69	73.156
4	0.995	5.525	78.681			
5	0.751	4.171	82.852			
6	0.656	3.646	86.498			
7	0.476	2.644	89.142			
8	0.386	2.146	91.288			
9	0.326	1.81	93.098			
10	0.308	1.712	94.81			
11	0.218	1.212	96.021			
12	0.172	0.957	96.978			
13	0.148	0.822	97.8			
14	0.138	0.766	98.566			
15	0.098	0.543	99.109			
16	0.073	0.406	99.515			
17	0.054	0.299	99.814			
18	0.034	0.186	100			
Extraction Method: Principal Component Analysis.						

With a KMO of 0.824 and significant Bartlett's Test, the analysis confirmed adequate sampling. These results indicate that challenges are multifaceted, spanning resource, procedural, and systemic concerns that must be addressed to make the licensing system viable.

The scree plot (see Figure 5), showed a visible elbow at the third component, confirming the three-factor solution. This indicates that challenges to implementing TLS are not singular but multidimensional, clustered into three categories: (a) resources and resistance, (b) systemic/procedural barriers, and (c) long-term sustainability issues such as teacher turnover.

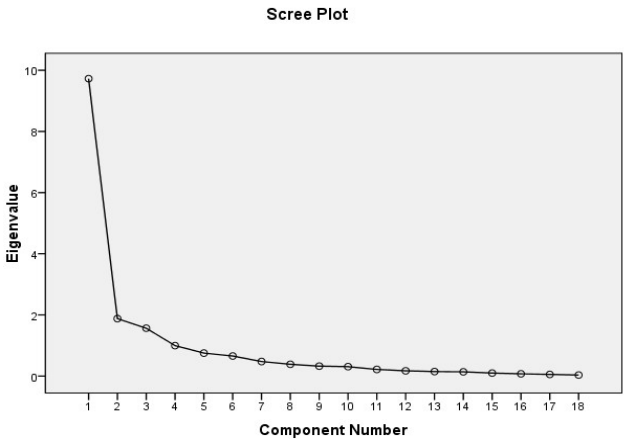

Figure 5. Potential Challenges

4.10 Suggestions for Successful Implementation

Table 12. Descriptive Statistics Suggestions for Successful implementation TLS

Items	Mean	Std. Deviation	Component Matrix		
			1	2	3
Teachers should be involved in the development of the licensing system.	4.547	0.695	0.895		
Teachers should be involved in implementation of the licensing system.	4.509	0.669	0.893		-0.13
Management should be involved in development of the licensing system.	4.642	0.558	0.874		
Management should be involved in implementation of the licensing system.	4.528	0.639	0.870		-0.189
Management should be involved in evaluation of the licensing system.	4.434	0.888	0.866	0.127	
Professional development training (of Management to implement)	4.623	0.686	0.856	-0.21	-0.29
Professional development training (of Management to monitor)	4.528	0.799	0.855		
Professional development training (of Management to evaluate)	4.547	0.748	0.837		0.347
Professional development training (of teachers to implement)	4.547	0.822	0.816	-0.462	0.151
Professional development training (of teachers to monitor)	4.453	0.822	0.810	-0.443	0.201
Professional development training (of teachers to evaluate)	4.491	0.823	0.788	-0.157	-0.203
Financial incentives (Funding) for implementation	4.528	0.696	0.754	0.426	0.227
Public awareness campaigns should be conducted to educate stakeholders	4.566	0.665	0.748	0.24	-0.437
Access to assessment tools and rubrics	4.547	0.637	0.742	-0.523	0.298
Collaboration with private schools/educational institutions	4.604	0.660	0.740	0.42	0.193
Collaboration with other school associations/unions	4.509	0.800	0.660	0.518	0.441
Collaboration with other political/ bureaucratic entities	4.359	1.040	0.626	0.183	-0.447

Note. Extraction Method: Principal Component Analysis; N = 53

PCA extracted three components from the suggestions, together explaining 80.3% of the variance**.** The first component emphasized stakeholder involvement (teachers and management in design, implementation, and evaluation) and professional development**.** The second component reflected collaboration and external linkages, including partnerships with schools, associations, unions, and political entities. The third component highlighted support measures, such as financial incentives, public awareness campaigns, and access to assessment tools.

Table 13. Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	11.03	64.885	64.885	11.03	64.885	64.885
2	1.499	8.819	73.704	1.499	8.819	73.704
3	1.137	6.688	80.392	1.137	6.688	80.392
4	0.897	5.275	85.668			
5	0.536	3.154	88.822			
6	0.386	2.272	91.094			
7	0.308	1.81	92.905			
8	0.274	1.611	94.515			
9	0.25	1.471	95.986			
10	0.216	1.269	97.256			
11	0.115	0.677	97.933			
12	0.098	0.574	98.507			
13	0.081	0.479	98.986			
14	0.065	0.383	99.369			
15	0.053	0.312	99.681			
16	0.032	0.19	99.871			
17	0.022	0.129	100			

Note. Extraction Method: Principal Component Analysis.

With KMO = 0.863 and Bartlett's Test significant, sampling adequacy was strong. These findings suggest that teachers recommend a participatory, well-supported, and collaborative approach**,** supported by resources and awareness, to ensure successful implementation of the licensing system.

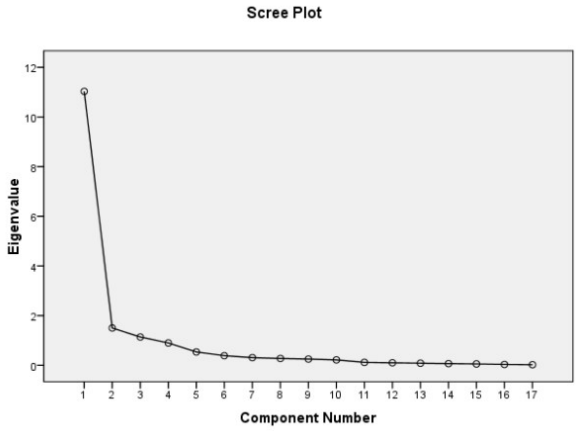

Figure 6. Suggestions for Successful Implementation

The scree plot (see Figure 6), indicated a bend after the third component, supporting the three-factor solution. This shows that suggestions cluster into three main domains: (a) involvement and capacity building, (b) collaboration and partnerships, and (c) support mechanisms (funding, awareness, tools). This confirms that successful implementation requires a multi-pronged strategy rather than relying on one single intervention.

4.11 Summary Construct Validity (PCA Findings)

Table: 14 PCA Extracted Factors and Variance (Summary)

Factor (Construct)	Eigenvalue	% of Variance	Cumulative %
Perceptions of Licensing (2 components extracted)	7.160	65.088	65.088
	1.057	9.609	74.697
Performance Aspects	4.516	56.450	56.450
Role of Management	7.198	71.979	71.979
Challenges (3 components extracted)	9.726	54.031	54.031
	1.878	10.435	64.466
	1.564	8.69	73.156
Suggestions for Implementation (3 components extracted)	11.03	64.885	64.885
	1.499	8.819	73.704
	1.137	6.688	80.392

Table: 20 Summary of PCA Results with Scree Plot Interpretation

Section	Factors Retained	Variance Explained	Scree Plot	Interpretation
1. Perceptions of Teachers about TLS	2	74.7%	Clear elbow after 2nd component	Perceptions cluster into two domains: (a) accountability & quality assurance, and (b) credibility & social value of the profession.
2. Performance Aspects	1	56.4%	Sharp drop after 1st component	Performance is seen as a holistic construct, integrating subject knowledge, pedagogy, ethics, and community engagement.
3. Role of Management	1	71.9%	Elbow after 1st factor	Management's role is perceived as unified and comprehensive, covering resources, training, monitoring, fairness, and trust-building.
4. Potential Challenges	3	73.2%	Bend at 3rd component	Challenges are multifaceted: (a) resource and resistance issues, (b) procedural/systemic barriers, and (c) sustainability concerns like teacher turnover.
5. Suggestions for Implementation	3	80.4%	Elbow after 3rd component	Suggestions fall into three clusters: (a) stakeholder involvement & training, (b) collaboration & partnerships, and (c) support mechanisms (funding, awareness, tools).

The PCA and scree plots confirmed a five-factor structure, consistent with the theoretical framework of the study.

Table: 21 Constructs, Example Items, and PCA Factors for Teacher Licensing Framework

Construct	Example Items (Indicators)	PCA Factor (Dimension)
Perceptions of Licensing	1. Licensing improves quality of education. 2. Licensing enhances credibility of teaching. 3. Licensing increases accountability. 4. Licensing promotes professional growth.	Perceived Value of Licensing (Quality, Credibility, Accountability, Growth)
Performance Aspects	1. Teachers demonstrate strong subject knowledge. 2. Teachers use effective instructional practices. 3. Teachers manage classrooms effectively. 4. Teachers exhibit professionalism and ethics. Teachers engage in continuous professional development.	Core Performance Dimensions (Pedagogy, Classroom Management, Knowledge, Ethics, CPD)
Role of Management	1. Management provides clear guidelines and standards. 2. Management ensures transparency and fairness. 3. Management allocates resources and training. 4. Management involves teachers in decision-making.	Administrative Support & Transparency
Challenges	1. Lack of financial and technological resources. 2. Resistance from teachers/unions. 3. Political/bureaucratic hurdles. Additional administrative burdens. 4. Teacher stress and turnover risk.	Implementation Barriers (Resources, Resistance, Burden)
Suggestions for Implementation	1. Involve teachers and management in development & implementation. 2. Provide professional development training. 3. Offer financial incentives and funding. 4. Conduct public awareness campaigns. 5. Establish monitoring and evaluation systems.	Enablers for Successful Licensing (Participation, Training, Resources, Monitoring)

5. Discussion

The study used Principal Component Analysis (PCA) to examine factors related to the Teacher Licensing System (TLS). Findings show that teachers' perceptions cluster into two domains accountability & quality assurance, and the credibility & social value of the profession. Performance aspects emerged as a holistic construct combining subject knowledge, pedagogy, ethics, classroom management, and professional development. The role of management was seen as unified and comprehensive, covering resources, training, monitoring, fairness, and trust-building. Challenges were identified as resource limitations, resistance, systemic barriers, and sustainability concerns such as teacher turnover. Suggestions for implementation emphasized stakeholder involvement, training, collaboration, partnerships, funding, awareness, and monitoring systems. Overall, the results highlight that teacher licensing is a multi-dimensional framework requiring strong management support, active stakeholder participation, and adequate resources for successful and sustainable implementation. These construct and dimensions ensured that the developed tool is theoretically grounded,

contextually relevant, statistically validated, and reliable, providing a robust foundation for developing a performance-based teacher licensing system.

5.1 Contribution of the Study

This study makes following contributions:

1. It provides a validated tool for measuring teacher performance in the Pakistani context, grounded in both local realities and international practices.
2. It identifies the specific performance aspects that should form the basis of a licensing system, thereby addressing a major gap in Pakistan's teacher evaluation system.
3. It integrates systemic and contextual factors (management roles, challenges, and enablers), offering a holistic framework for policy adoption rather than a narrow performance checklist.

5.2 Limitations & Recommendations

While the tool demonstrated strong validity and reliability, the pilot study was conducted with a relatively small sample size (n = 100) from randomly selected elementary schools, limiting generalizability.

i. Only exploratory analysis (PCA) was conducted. Future research should employ Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM) with a larger and more diverse sample to further validate the framework. Additionally, qualitative insights (e.g., teacher/ head-teachers, educational managerial personnels interviews) could strengthen the contextual understanding of challenges and enablers.
ii. Professional development, resource allocation policies, and awareness campaigns should accompany licensing reforms to ensure teacher acceptance and sustainability.
iii. Cross-country comparisons (with UAE, Singapore, and OECD models) should be undertaken to refine and benchmark the system for global compatibility.

Acknowledgement

The author declares that her name appears as *Bushra Mustafa Kamal* in her CNIC and passport, whereas in her educational documents it is recorded as *Bushra Gul Yousafzai*. She is currently enrolled as a PhD scholar in Educational Planning and Management (EPM) at the Department of EPPSL, Allama Iqbal Open University, Islamabad. The present study is the author's original work and compilation.

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