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An Empirical Study On The Impact Of Teaching And Learning And Performance Results Feedback On Appraisal Systems Through Optimization Strategies

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Abstract

Background:*In recent years, the effectiveness of faculty performance appraisal systems in higher education has become a central concern for institutional accountability and development. Teaching quality, workload distribution, feedback mechanisms, and strategic optimization all play critical roles in shaping educators' perceptions and engagement with these systems.*
Objective: *This study aims to examine the structural relationships among teaching and learning practices, performance results feedback, optimization strategy, and the faculty performance appraisal system within undergraduate institutions in Heilongjiang Province, China.*
Methods: *A quantitative, deductive research approach was adopted, using stratified random sampling to survey 396 permanent faculty members across 39 universities. Data were collected through validated questionnaires and analyzed via structural equation modeling (SEM) using AMOS.*
Results: *Teaching and learning practices and performance feedback had significant direct effects on the performance appraisal system, and both positively influenced optimization strategy. Optimization strategy, in turn, showed a strong direct effect on the appraisal system and partially mediated both relationships. All paths were statistically significant ($p < .01$), confirming model validity.*
Conclusion: *Faculty appraisal systems are driven not only by teaching and feedback, but also by strategic optimization efforts. Standardized processes, diverse metrics, and incentive-based strategies enhance system effectiveness. These insights support policy reforms focused on integrating instructional quality with strategic evaluation design.*

Keyword: *Teaching and Learning, Performance Results Feedback, Performance Appraisal Systems , Optimization Strategies.*

1.INTRODUCTION

In the landscape of global higher education, performance appraisal systems (PAS) serve as pivotal mechanisms for aligning institutional strategic goals with faculty contributions in teaching, research, and service. However, empirical evidence suggests that the efficacy of PAS is often undermined by misaligned evaluation criteria, particularly in the domains of Teaching and Learning (TL) and Performance Results Feedback (PRF). Specifically, the quantification of teaching workload and teaching quality/outcomes remains contentious, as existing metrics inadequately capture the complexity of pedagogical contributions, leading to demotivation and misdirected efforts among faculty (Greene & Popovski, 2022). Similarly, feedback on results and guidance on problem improvement—critical components of PRF—are frequently overlooked or superficially implemented, resulting in missed opportunities for professional development and institutional advancement (Aminatu et al., 2023).
In China, these challenges are exacerbated by a one-size-fits-all evaluation paradigm, which disproportionately prioritizes research outputs over teaching excellence, as evidenced by the systemic undervaluation of curriculum development, mentorship, and innovative pedagogical practices in Heilongjiang Province's 39 universities (Liu & Xia, 2023). This mismatch not only distorts faculty incentives but also undermines the optimization strategies (OP)—such as targeted professional development programs or workload redistribution—needed to bridge gaps between individual performance and institutional objectives. While prior studies have isolated TL or PRF as

predictors of PAS outcomes, the mediating role of OP in translating these dimensions into actionable improvements remains unexplored.

This study addresses this critical gap by investigating how TL (teaching workload and quality/outcomes) and PRF (feedback and guidance) influence PAS effectiveness via OP. By elucidating these pathways, we aim to provide a theoretically grounded and empirically validated framework for designing PAS that holistically integrates teaching excellence and feedback-driven improvement, thereby fostering institutional sustainability and faculty retention in China's evolving higher education context.

2.EMPIRICAL REVIEW

EFFECTS OF TEACHING AND LEANING ON PERFORMANCE APPRAISAL SYSTEM

The teacher performance appraisal system is vital for improving educational quality and student achievement. Achaa (2023) highlights that effective teachers drive student growth through goal-oriented and competency-based teaching, and that appraisal systems formally recognize and support professional development. Mazha (2015) emphasizes that standardized mechanisms in higher education enhance instructional methods, staff satisfaction, and student employability. In China, university appraisal systems are predominantly outcome-oriented, focusing on metrics such as teaching hours and publications while neglecting qualitative factors like teacher behavior and attitude (Lv & Yu, 2013). The Ministry of Education has called for urgent reform to emphasize teaching quality over quantity and apply more scientific evaluation structures (Yang, 2017).

Overall, scholars advocate for a more balanced and comprehensive evaluation framework that addresses both teaching outputs and instructional processes. This study adopts "teaching workload" and "teaching quality and outcomes" as two key dimensions for investigating the effectiveness of appraisal systems in higher education.

EFFECTS OF FEEDBACK ON PERFORMANCE APPRAISAL SYSTEM

Performance appraisal systems have been widely recognized as crucial mechanisms for enhancing teaching quality in higher education institutions. Anjum et al. (2011) explored the implementation of such systems at Bahauddin Zakariya University, Pakistan, revealing that while teachers acknowledged the potential benefits of appraisal mechanisms, their effectiveness was hampered by challenges such as lack of rater training, limited multi-source input, and insufficient feedback. The study emphasizes that performance evaluation should serve not only for promotion decisions but also to identify teacher development needs and foster ongoing improvement through clear criteria and systematic feedback.

Rasheed et al. (2011) similarly identified the need for transparency and inclusivity in faculty appraisal practices at Islamia University of Bahawalpur. Their study advocates for a 360-degree feedback model, incorporating input from students, peers, administrators, and faculty themselves. Such integrated feedback loops are essential for pinpointing instructional deficiencies and promoting reflective practice among educators. The researchers argue that an inclusive performance review mechanism can significantly enhance institutional quality and faculty performance when used strategically for training and promotion decisions.

In contrast, Liu (2016) highlights limitations in the UK's college teacher appraisal systems, where summative evaluation often overshadows developmental processes. The lack of communication and feedback hinders the system's effectiveness. Liu recommends an appraisal framework combining formative and summative elements, with continuous index adjustment aligned with talent development goals. Effective feedback should encourage self-reflection and action planning, ultimately fostering both individual growth and institutional advancement. These insights support the need for context-sensitive, multidimensional appraisal systems grounded in continuous improvement and transparent evaluation practices.

THE RELATIONSHIP BETWEEN OPTIMIZATION STRATEGY AND PERFORMANCE APPRAISAL SYSTEM

Recent research has underscored the importance of optimization strategies in enhancing the effectiveness of performance appraisal systems (PAS) within higher education. Liu and Fang (2023) constructed a novel teacher appraisal index system using artificial intelligence—specifically a radial basis function neural network—to analyse historical evaluation data. Their study revealed low excellence rates among college faculty and highlighted the need for strategic interventions such as competitive remuneration, classification-based appraisal, and feedback-oriented updates. These optimization strategies function as mediating mechanisms by improving clarity, motivation, and alignment between appraisal outcomes and institutional goals.

Similarly, Peng (2022) extended the application of optimization frameworks into enterprise HRM, proposing a KPI-based performance appraisal mechanism that strengthened managerial motivation and organizational vitality. The implementation of diversified appraisal teams and multi-level index systems illustrated how optimized design enhances accountability and forecast accuracy. Lessons drawn from corporate sectors—particularly in appraisal standardization and data-driven feedback loops—offer strategic insights for adapting university-level PAS to dynamic educational environments.

In Chinese universities, performance appraisal systems often suffer from rigidity and lack developmental orientation (Cui et al., 2022). Zheng and Sun (2022) emphasised the importance of aligning teacher appraisal systems with institutional strategic planning, suggesting that optimization strategies—such as integrating "360°+KPI" models—can bridge gaps between appraisal structure, teacher competencies, and talent cultivation goals. These strategies not only improve appraisal quality but serve as mediators, facilitating the translation of strategic priorities into measurable professional development outcomes.

3.THEORETICAL REVIEW

EXPECTANCY THEORY

Expectancy Theory, formulated by Vroom (1964), underscores the belief that motivation stems from an individual's expectation that effort will lead to performance and that performance will result in desired outcomes. In recent years, scholars have extended this theory to fit complex organizational and educational contexts where feedback, teaching quality, and performance evaluation play critical roles. Eccles and Wigfield (2023) introduced the Situated Expectancy-Value Theory, highlighting how task value and contextual feedback shape motivation and self-regulation. Similarly, Permzadian and Shen (2024) demonstrated that expectancy, instrumentality, and valence significantly predict academic behaviors, revealing that learners are more motivated when clear performance pathways and meaningful rewards are present. In structured systems where teaching activities and performance feedback interact with optimization and appraisal processes, Expectancy Theory offers a robust framework to interpret the cognitive mechanisms behind individual engagement and improvement. The theory supports the idea that educational feedback and strategic optimization not only provide instrumental clarity but also enhance the perceived value of performance goals, thus strengthening behavioral commitment.

GOAL-SETTING THEORY

Goal-Setting Theory, pioneered by Locke and Latham (1990), postulates that specific and challenging goals lead to higher performance through focused effort, increased persistence, and heightened self-regulation. This theory has been widely adopted in educational performance research to analyze how goal clarity and feedback mechanisms affect learning outcomes. Recent studies reaffirm its validity in higher education: for example, Martins van Jaarsveld et al. (2025) found that goal-setting interventions significantly improve self-directed learning, especially when combined with consistent feedback loops. Furthermore, Heintalu et al. (2025) proposed the Integrated Goal Setting and Orientation (IGSO) framework, which merges goal orientation with strategic goal formulation to optimize motivation in educational systems. In multifactor performance environments, such as those involving teaching, feedback, optimization strategies, and appraisal systems, Goal-Setting Theory explains how targeted strategies and structured feedback serve as dynamic goal formulations, guiding learners and educators toward measurable outcomes. When strategic planning is linked with motivational goal-setting, individuals are more likely to engage deeply with performance expectations and contribute meaningfully to continuous quality improvement.

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4.CONCEPTUAL FRAMEWORK

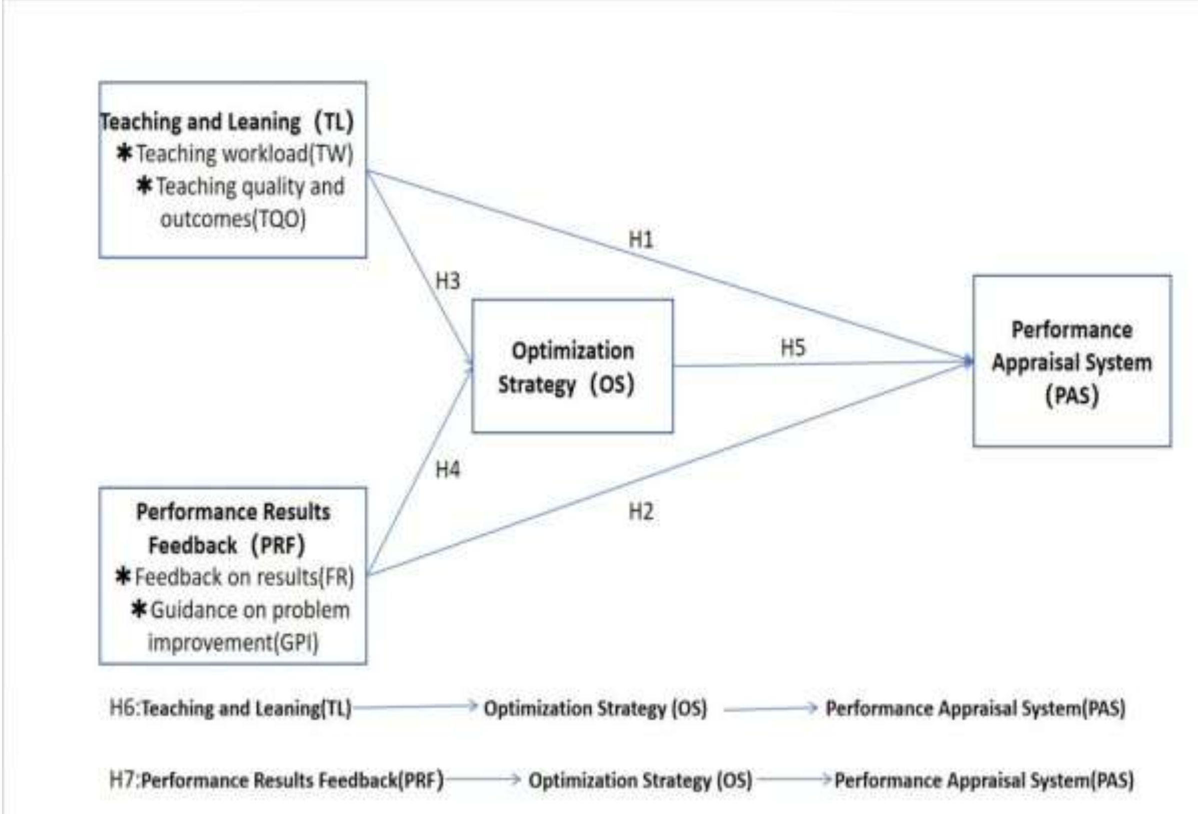

Figure 1

Hypotheses

H1: *There is a significant positive relationship between Teaching and Learning and* Performance Appraisal System.
H2: Performance Results Feedback positively influences the Performance Appraisal System.
H3: Teaching and Learning positively influence the Optimization Strategy.
H4: Performance Results Feedback positively influences Optimization Strategy.
H5: Optimization Strategy positively influences the Performance Appraisal System.
H6: Optimization Strategy mediates the relationship between Teaching and Learning and the Performance Appraisal System.
H7: Optimization Strategy mediates the relationship between Performance Results Feedback and the Performance Appraisal System.

5.MATERIALS AND METHODS

STUDY DESIGN AND POPULATION

This study adopts a deductive, positivist research approach with a quantitative methodology. The target population includes 37,139 permanent faculty members from 39 undergraduate colleges in Heilongjiang Province, China, excluding administrators and support staff. Faculty lists were obtained from each institution's official website and stratified by institutional level to ensure diversity and representativeness.

SAMPLING STRATEGY AND SAMPLE SIZE

A stratified random sampling technique was applied to account for institutional differences. The sample size was determined using standard statistical formulas (Yamane; Krejcie & Morgan), yielding a minimum size of 396 respondents. Each institution was proportionally represented, and faculty members were selected accordingly to improve generalizability.

DATA COLLECTION AND INSTRUMENTS

Primary data were collected via structured questionnaires based on the conceptual framework's variables. Surveys were distributed both online and offline to accommodate geographic and technological variations. Secondary data, such as reports and web content from institutional sources, were used to supplement and validate findings.

RESEARCH SETTING AND ANALYSIS

The study took place in a non-contrived, natural environment with individuals as units of analysis. A cross-sectional time horizon was adopted for one-time data collection. Quantitative techniques including descriptive statistics and using statistical software to examine relationships and test theoretical assumptions.

MEASUREMENT ITEMS

Table 1: Measurement Items

Variable	Dimension	Item Code	Measurement Item (English)
Teaching and Learning	Teaching Workload	TW1	I believe it is scientifically valid to evaluate teaching performance using quantitative metrics.
		TW2	Teaching performance appraisal should emphasize teaching quality.
		TW3	The current system for allocating teaching workload and assigning tasks is methodologically sound.
		TW4	I actively design diversified teaching activities to enhance instructional effectiveness.
		TW5	I perceive that existing performance appraisal indicators fairly represent my teaching efforts.
	Teaching Quality and Outcomes	TQO1	I consistently complete teaching content with rigor and aim to improve instructional quality.
		TQO2	I prioritize the cultivation of students' learning capabilities.
		TQO3	The performance appraisal system enhances teaching quality and promotes individual capabilities.
		TQO4	I adhere to the educational essence of teaching while implementing classroom instruction.
		TQO5	I meticulously prepare lessons and uphold professional responsibility towards students.
Performance Results Feedback	Feedback on Results	FR1	I receive information regarding the outcome of each performance appraisal.
		FR2	Feedback from appraisals encourages me to enhance my teaching performance.
		FR3	My appraisal results are closely tied to financial remuneration.
		FR4	I consider the performance appraisal outcomes to be fair.
		FR5	I believe current appraisal scores or compensation reflect actual work performance.
	Guidance on Problem Improvement	GPI1	My most recent performance evaluation accurately reflected my overall contribution.
		GPI2	Evaluation outcomes have provided valuable direction for my career development.
		GPI3	I actively engage with the appraisal system when invited to offer feedback.

		GPI4	Post-appraisal interviews effectively guide professional improvement.
		GPI5	The improvement plans offered after appraisal are targeted and constructive.
Optimization Strategy		OS1	I find the overall procedures of the performance appraisal system to be well-standardized.
		OS2	Current evaluation indicators should be broadened to reflect diverse teaching contributions.
		OS3	Performance-linked incentives and rewards enhance teachers' productivity.
		OS4	Appraisal strategies have supported teaching staff in achieving professional objectives.
		OS5	These strategies have contributed to operational efficiency within the institution.
		OS6	The current appraisal practices foster teacher motivation.
Performance Appraisal System		PAS1	I am satisfied with the teacher performance appraisal procedures at my institution.
		PAS2	The appraisal system goals are clearly communicated to all faculty members.
		PAS3	The performance appraisal system is a valid tool for evaluating teaching quality.
		PAS4	Appraisals help faculty identify strengths and areas for improvement.
		PAS5	Performance evaluation outcomes are used to determine rewards or salary adjustments.

6. DATA ANALYSIS PROCESS NORMAL PROBABILITY

Table 2： Descriptive Statistics

	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
TW1	3.45	1.195	-.453	.119	-.593	.237
TW2	3.40	1.302	-.417	.119	-.882	.237
TW3	3.42	1.276	-.422	.119	-.784	.237
TW4	3.43	1.297	-.455	.119	-.856	.237
TW5	3.05	1.441	-.072	.119	-1.354	.237
TQO1	3.48	1.269	-.455	.119	-.830	.237
TQO2	3.49	1.229	-.481	.119	-.698	.237
TQO3	3.43	1.306	-.396	.119	-.950	.237
TQO4	3.39	1.220	-.382	.119	-.689	.237
TQO5	3.45	1.287	-.484	.119	-.807	.237
FR1	3.34	1.289	-.379	.119	-.976	.237
FR2	3.30	1.185	-.387	.119	-.698	.237
FR3	3.38	1.267	-.302	.119	-.969	.237

FR4	2.94	1.376	.030	.119	-1.286	.237
FR5	3.25	1.303	-.368	.119	-.971	.237
GPI1	3.40	1.280	-.378	.119	-.911	.237
GPI2	3.41	1.247	-.379	.119	-.836	.237
GPI3	3.35	1.276	-.345	.119	-.895	.237
GPI4	3.41	1.197	-.327	.119	-.723	.237
GPI5	3.41	1.238	-.398	.119	-.789	.237
OS1	3.62	1.222	-.675	.119	-.655	.237
OS2	3.56	1.284	-.666	.119	-.726	.237
OS3	3.33	1.340	-.241	.119	-1.161	.237
OS4	3.54	1.287	-.657	.119	-.605	.237
OS5	3.57	1.248	-.648	.119	-.548	.237
OS6	3.60	1.291	-.685	.119	-.584	.237
PAS1	3.65	1.238	-.641	.119	-.557	.237
PAS2	3.75	1.187	-.833	.119	-.092	.237
PAS3	3.72	1.256	-.762	.119	-.432	.237
PAS4	3.68	1.243	-.751	.119	-.397	.237
PAS5	3.50	1.288	-.484	.119	-.887	.237

The descriptive statistics analysis revealed meaningful insights into respondents' perceptions of the performance appraisal system across multiple dimensions. Most items recorded mean scores ranging from 3.30 to 3.75, indicating generally favorable attitudes toward the teaching workload, quality of instruction, feedback mechanisms, and appraisal outcomes. Notably, the highest mean scores were observed in PAS2 and PAS3, reflecting faculty consensus on the clarity and validity of the appraisal system's goals and tools. Standard deviations mostly hovered around 1.2 to 1.3, suggesting a reasonably diverse distribution of responses. TW5 and FR4 exhibited slightly higher variation, signaling greater disagreement among teachers regarding how well performance metrics and feedback mechanisms reflect their actual efforts.

In terms of distribution characteristics, the skewness values were predominantly negative, ranging from -0.241 to -0.833, indicating a tendency of respondents to favor higher ratings on most items. Only FR4 showed a slight positive skew, implying reservations about the fairness of appraisal outcomes among some participants. Kurtosis values were generally negative as well, pointing to moderately flattened distributions without significant peakedness. While several items such as TW5 and FR4 showed more pronounced platykurtic features, all variables remained within acceptable ranges for normality assumptions. Overall, the data were sufficiently normal and well-behaved for subsequent parametric statistical analysis, lending credibility to the reliability of the constructs and setting a strong foundation for hypothesis testing.

Table 3: Reliability test

Reliability Analysis					
Variable	Dimension	Item	CITC	Cronbach's Alpha if Item Deleted	Cronbach's α
TL	TW	TW1	.702	.863	0.883
		TW2	.741	.853	
		TW3	.716	.859	
		TW4	.707	.861	
		TW5	.738	.855	
	TQO	TQO1	.712	.847	0.875

		TQO2	.705	.849	
		TQO3	.714	.847	
		TQO4	.691	.852	
		TQO5	.700	.850	
PRF	FR	FR1	.742	.858	0.887
		FR2	.679	.873	
		FR3	.741	.859	
		FR4	.731	.861	
		FR5	.738	.859	
	GPI	GPI1	.684	.843	0.869
		GPI2	.705	.838	
		GPI3	.700	.839	
		GPI4	.669	.847	
		GPI5	.704	.838	
OS	~	OS1	.769	.882	0.904
		OS2	.776	.880	
		OS3	.745	.885	
		OS4	.723	.888	
		OS5	.712	.890	
		OS6	.690	.893	
PAS	~	PAS1	.709	.854	0.880
		PAS2	.668	.864	
		PAS3	.692	.859	
		PAS4	.734	.849	
		PAS5	.758	.843	

To assess the internal consistency of the measurement instruments used in this study, reliability analysis was conducted across all constructs using Cronbach's alpha and Corrected Item-Total Correlations (CITC). The results demonstrated high reliability across all dimensions and overall variables.

For the Teaching and Learning (TL) construct, two dimensions were analyzed. The Teaching Workload (TW) dimension yielded a Cronbach's alpha of 0.883, with CITC values ranging from .702 (TW1) to .741 (TW2), indicating good item homogeneity. Similarly, the Teaching Quality and Outcomes (TQO) dimension demonstrated a Cronbach's alpha of 0.875, with CITC values between .691 and .714, reflecting high consistency and acceptable discriminative power across its five items.

The Performance Results Feedback (PRF) variable was divided into two dimensions. The Feedback on Results (FR) dimension achieved a Cronbach's alpha of 0.887, with CITC values ranging from .679 to .742, suggesting strong internal consistency. The Guidance on Problem Improvement (GPI) dimension followed with a Cronbach's alpha of 0.869 and CITC scores between .669 and .705, further confirming its measurement reliability.

The construct of Optimization Strategy (OS) showed excellent reliability with a Cronbach's alpha of 0.904. All six items exhibited CITC values well above the threshold (.690 to .776), reinforcing the unidimensionality and robustness of the instrument. Lastly, the Performance Appraisal System (PAS) construct produced a Cronbach's alpha of 0.880. CITC values ranged from .668 to .758, indicating strong correlations between each item and the total scale score.

In summary, all scales demonstrated high internal reliability with Cronbach's alpha coefficients exceeding the commonly accepted threshold of 0.70. These findings support the appropriateness of the items for measuring the respective constructs and contribute to the overall validity and reliability of the questionnaire design.

Exploratory Factor Analysis (EFA)

Table 4： KMO and Bartlett's Test

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.940
Bartlett's Test of Sphericity	Approx. Chi-Square	7554.839
	df	465
	Sig.	.000

The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy was calculated at 0.940, indicating excellent suitability for factor analysis, as values above 0.90 are generally considered superb. This suggests that the partial correlations among variables are relatively low, and the dataset contains sufficient common variance to support the extraction of reliable factors. Additionally, Bartlett's Test of Sphericity yielded a highly significant result ($\chi^2 = 7554.839$, df = 465, $p < .001$), confirming that the correlation matrix is not an identity matrix and that correlations among the variables are statistically significant. Together, these results validate the appropriateness of applying exploratory factor analysis (EFA) to this dataset and affirm the structural integrity of the measurement model.

Table 5: Principal component analysis

Total Variance Explained

Initial Eigenvalues				Extraction Sums of Squared Loadings			Total	Rotation Sums of Squared Loadings % of Variance	Cumulative %
Component Total		% of Variance	Cumulative %	Total	% of Variance	Cumulative %			
1	10.388	33.511	33.511	10.388	33.511	33.511	4.140	13.356	13.356
2	3.647	11.763	45.274	3.647	11.763	45.274	3.447	11.118	24.474
3	2.678	8.638	53.912	2.678	8.638	53.912	3.406	10.987	35.461
4	2.036	6.567	60.479	2.036	6.567	60.479	3.377	10.893	46.354
5	1.220	3.937	64.415	1.220	3.937	64.415	3.368	10.864	57.219
6	1.121	3.615	68.031	1.121	3.615	68.031	3.352	10.812	68.031
7	.610	1.968	69.999						
8	.555	1.790	71.789						
9	.527	1.700	73.489						
10	.515	1.661	75.150						
11	.511	1.649	76.799						
12	.493	1.592	78.391						
13	.477	1.539	79.929						
14	.458	1.476	81.406						
15	.441	1.423	82.829						
16	.438	1.412	84.241						
17	.421	1.359	85.600						
18	.410	1.321	86.921						
19	.391	1.262	88.183						
20	.379	1.223	89.406						
21	.369	1.190	90.596						
22	.358	1.154	91.751						
23	.345	1.111	92.862						
24	.329	1.062	93.924						

25	.313	1.009	94.933						
26	.295	.951	95.884						
27	.284	.916	96.800						
28	.270	.872	97.672						
29	.265	.856	98.528						
30	.238	.767	99.295						
31	.219	.705	100.000						

The results of the principal component analysis indicate that six components collectively explain 68.031% of the total variance before rotation. After applying the Varimax rotation method, the variance was more evenly distributed, with each of the six rotated components contributing between 10.812% and 13.356% of explained variance. This redistribution enhances interpretability by aligning the components more distinctly with the underlying construct dimensions.

The initial eigenvalues of components 1 through 6 exceeded the threshold value of 1.0, reinforcing their suitability for retention. Component 1 initially captured the most variance at 33.511%, while Component 2 contributed an additional 11.763%. Together, the first three components accounted for more than half of the total explained variance, validating the multidimensional nature of the construct and the robustness of the instrument design.

Beyond the sixth component, the remaining factors contributed progressively less to variance, with eigenvalues dropping below 1.0—indicating they are likely noise rather than meaningful latent factors. Thus, the six-factor structure extracted through rotation is both statistically sound and conceptually appropriate, providing a stable foundation for subsequent confirmatory factor analysis and structural modeling.

Table 6: Rotated component matrix

Rotated Component Matrix[a]

Component

1		2	3	4	5	6
TW1	.165	.128	.185	.091	**.775**	.092
TW2	.103	.113	.290	.044	**.772**	.070
TW3	.045	.143	.298	.072	**.746**	.084
TW4	.118	.088	.232	.071	**.763**	.096
TW5	.108	.101	.442	.032	**.683**	.146
TQO1	.146	.088	**.744**	.076	.286	.059
TQO2	.186	.144	**.705**	.127	.299	.061
TQO3	.142	.120	**.721**	.071	.325	.094
TQO4	.154	.134	**.754**	.012	.203	.157
TQO5	.125	.129	**.747**	.116	.236	.087
FR1	.131	.191	.044	**.787**	.033	.226
FR2	.185	.126	.114	**.730**	.008	.212
FR3	.205	.101	.061	**.748**	.137	.268
FR4	.030	.077	.076	**.737**	.073	.397
FR5	.215	.091	.089	**.759**	.086	.250
GPI1	.165	.114	.117	.303	.103	**.694**
GPI2	.158	.071	.084	.255	.117	**.742**
GPI3	.180	.134	.106	.271	.059	**.723**
GPI4	.127	.143	.023	.224	.098	**.735**
GPI5	.079	.047	.136	.202	.080	**.789**
OS1	**.807**	.141	.135	.144	.117	.051
OS2	**.789**	.205	.183	.135	.076	.091
OS3	**.769**	.213	.096	.155	.115	.081
OS4	**.765**	.152	.099	.076	.097	.188
OS5	**.751**	.134	.136	.112	.074	.179
OS6	**.739**	.108	.111	.152	.089	.134
PAS1	.131	**.778**	.108	.138	.124	.102

PAS2	.125	**.760**	.088	.131	.063	.087
PAS3	.196	**.749**	.156	.092	.097	.081
PAS4	.211	**.783**	.069	.069	.146	.128
PAS5	.189	**.806**	.140	.094	.100	.072

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 7 iterations.

The rotated component matrix from the principal component analysis confirms the presence of a well-defined six-factor structure, with variables loading distinctly onto their respective components. Items associated with the Optimization Strategy (OS) show strong and consistent loadings on Component 1 (e.g., OS1 = .807, OS2 = .789), indicating this component clearly represents the optimization dimension. Similarly, items from the Performance Appraisal System (PAS) dimension load highly onto Component 2 (e.g., PAS5 = .806, PAS4 = .783), supporting its validity as a separate construct.

Teaching Quality and Outcomes (TQO) items load strongly onto Component 3 (e.g., TQO4 = .754, TQO1 = .744), distinguishing this factor from Teaching Workload (TW), which is well-represented by Component 5 (e.g., TW1 = .775, TW2 = .772). Feedback on Results (FR) items are clustered around Component 4 (e.g., FR1 = .787, FR5 = .759), indicating coherent grouping within the feedback dimension. Meanwhile, items under the Guidance on Problem Improvement (GPI) dimension exhibit high loadings on Component 6 (e.g., GPI5 = .789, GPI2 = .742), affirming its statistical separability.

Each item showed a dominant loading on one factor and minimal cross-loadings on others, reinforcing factorial clarity. This matrix suggests that the items are well-structured and align with the conceptual dimensions of the model, thus providing empirical support for the construct validity of the measurement framework and confirming the appropriateness of the six-factor solution derived through Varimax rotation.

STRUCTURAL EQUATION MODEL (SEM)

Figure 2: Structure Model

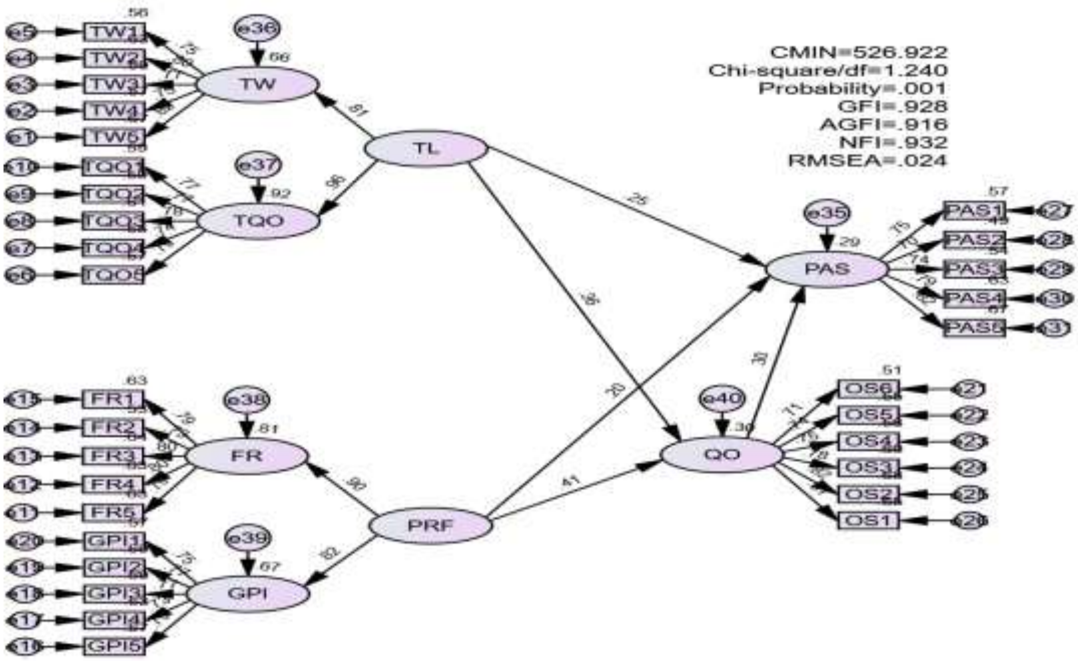

Table 8: Path Coefficient

UnStd. Estimate		Std. Est	S.E.	C.R.	P	Result
	UnStd. Estimate	Std. Est	S.E.	C.R.	P	Result
PAS<-TL	.238	.249	.055	4.297	***	Supported
PAS<-PRF	.201	.205	.061	3.284	.001	Supported
QO<-TL	.337	.358	.053	6.372	***	Supported
QO<-PRF	.401	.413	.062	6.467	***	Supported
PAS<-QO	.299	.296	.065	4.600	***	Supported

The structural equation modeling results provide robust empirical support for the proposed hypotheses. Specifically, the standardized path coefficient between Teaching and Learning (TL) and Performance Appraisal System (PAS) was 0.249 (CR = 4.297, $p < .001$), confirming H1 that higher-quality teaching is positively associated with how faculty perceive and engage with appraisal systems. Likewise, Performance Results Feedback (PRF) had a statistically significant effect on PAS, with a standardized coefficient of 0.205 (CR = 3.284, $p = .001$), supporting H2 and suggesting that timely, relevant feedback contributes meaningfully to faculty satisfaction with appraisal mechanisms.

The results also show strong relationships between both TL and PRF in shaping Optimization Strategy (QO). TL influenced QO with a standardized estimate of 0.358, while PRF had an even stronger effect at 0.413 (both $p < .001$), thus supporting H3 and H4. These findings highlight the foundational role that teaching and feedback play in fostering strategic improvement efforts. Finally, the link from QO to PAS was also significant ($\beta = 0.296$, CR = 4.600, $p < .001$), validating H5 and demonstrating that optimized appraisal strategies have direct positive effects on how teachers experience and interpret performance evaluation systems.

Together, these results underscore the interconnectedness of pedagogical quality, feedback mechanisms, strategic optimization, and appraisal system effectiveness within higher education institutions.

MEDIATING EFFECT

Figure 3: Mediating effect of OS in the relationship between TL and PAS

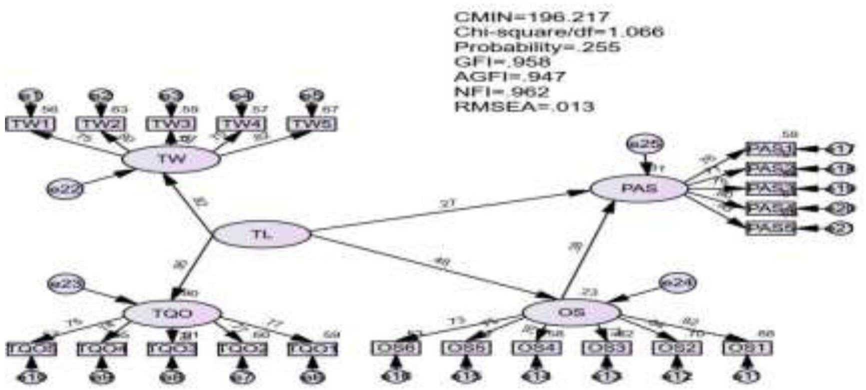

Table 9:TL→OS→PAS

Relationship	TL→OS→PAS			
Effect	Estimate	Confidence Interval		P
		Lower	Upper	
Total effect	.584	.456	.752	.010
Indirect effect	.232	.155	.324	.010
Direct effect	.353	.221	.540	.010

The findings provide clear empirical support for Hypothesis 6 (H6), which posits that Optimization Strategy (OS) mediates the relationship between Teaching and Learning (TL) and the Performance Appraisal System (PAS). The mediation analysis reveals a statistically significant indirect effect of 0.232 (95% CI: 0.155–0.324, p = .010), confirming that OS serves as a key conduit through which instructional quality influences appraisal outcomes. While the direct path from TL to PAS (0.353, p = .010) remains significant, the added contribution from OS indicates that optimization efforts—such as refining appraisal procedures, broadening evaluation criteria, and aligning goals—play a vital role in strengthening teachers' perceptions of the appraisal system.

This partial mediation illustrates that even strong teaching practices benefit further from strategic infrastructure that supports performance management. In other words, the performance appraisal system's effectiveness is not solely driven by what teachers do in the classroom, but by how those actions are recognized, guided, and reinforced through institutional mechanisms. These results align with the framework's assertion that appraisal systems should operate as dynamic, responsive tools embedded within broader strategic processes, not as isolated evaluation devices.

Figure 4: Mediating effect of OS in the relationship between PRF and PAS

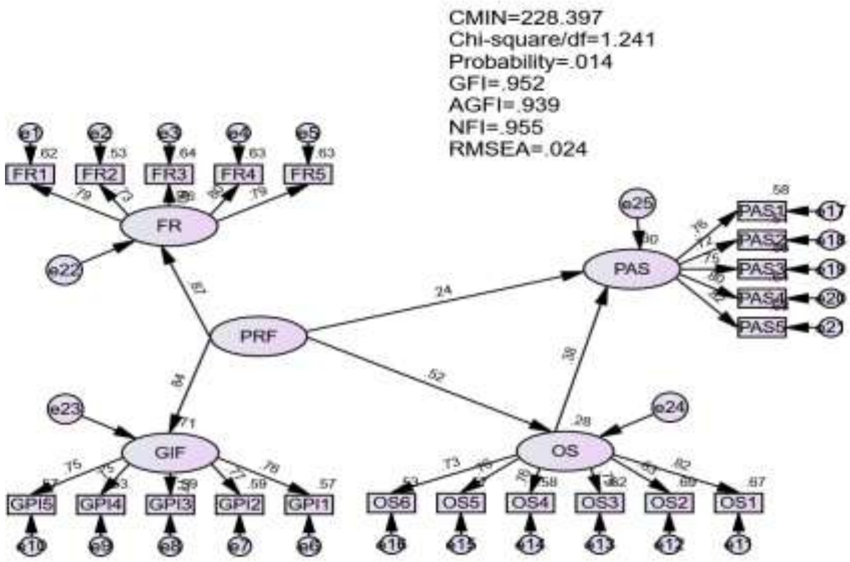

Table 10: PRF→OS→PAS

Relationship	PRF→OS→PAS			
Effect	Estimate	Confidence Interval		P
		Lower	Upper	
Total effect	.471	.359	.602	.010
Indirect effect	.211	.137	.287	.010
Direct effect	.260	.139	.393	.010

The mediation analysis provides compelling evidence in support of Hypothesis 7 (H7), which proposes that Optimization Strategy (OS) serves as a mediator in the relationship between Performance Results Feedback (PRF) and the Performance Appraisal System (PAS).

The total effect of PRF on PAS is 0.471, with a 95% confidence interval between 0.359 and 0.602 and a p-value of .010, indicating a statistically significant and moderately strong association. This effect comprises a direct effect of 0.260 (CI: 0.139–0.393, $p = .010$) and an indirect effect of 0.211 (CI: 0.137–0.287, $p = .010$), both of which are significant.

These results confirm a partial mediation, meaning that PRF influences PAS directly and also indirectly through OS. The strength of the indirect effect suggests that the way performance feedback is processed and operationalized—via optimized strategies such as structured guidance, incentive alignment, and continuous improvement mechanisms—greatly enhances faculty perceptions of fairness, clarity, and effectiveness in appraisal systems.

By validating H7, the analysis underscores the transformative role of strategic optimization: feedback alone has impact, but when translated into refined processes and goal-oriented systems, it becomes a far more powerful driver of institutional performance culture.

7.DISCUSSION AND CONCLUSION

The present study offers a comprehensive examination of the factors that shape the optimization and perceived effectiveness of performance appraisal systems for university faculty members in Heilongjiang Province. By utilizing a structural equation modeling approach and testing both direct and mediated relationships, the findings reveal a multifaceted framework of institutional and behavioral influences.

One of the clearest observations emerges from the significant direct impacts of teaching practices and feedback mechanisms on appraisal system outcomes. Faculty members who exhibit strong engagement in teaching and learning activities tend to report higher levels of satisfaction and alignment with institutional appraisal systems. This underscores the idea that instructional commitment and workload alignment remain critical components in shaping teacher perceptions of fairness, transparency, and value within performance evaluations. Similarly, timely and relevant performance results feedback demonstrates a substantial direct influence, affirming its role in reinforcing accountability and fostering continuous improvement. These insights highlight that performance appraisal systems function not only as evaluative tools but also as behavioral reinforcers when anchored in high-quality instructional and feedback environments.

Beyond the direct pathways, the study identified Optimization Strategy as a significant mediating factor that channels the influence of both instructional quality and feedback into improved appraisal outcomes. The indirect effects were statistically robust, and both mediating models exhibited partial mediation, suggesting that optimization efforts—such as standardized evaluation procedures, diversified indicators, and strategically aligned incentives—enhance the efficiency and perceived equity of performance management systems. In particular, optimization mechanisms amplify the reach and depth of teaching and feedback processes, translating them into structured appraisal outcomes that are more meaningful and impactful for faculty.

The theoretical frameworks selected for the study—Expectancy Theory and Goal-Setting Theory—are well reflected in the empirical results. Teaching and feedback initiatives provide the motivational inputs described in Expectancy Theory, where effort leads to performance and performance leads to valued outcomes. Optimization Strategy functions similarly to the goal structure proposed in Goal-Setting Theory, clarifying expectations and reinforcing direction toward institutional targets. These combined theoretical elements offer a compelling lens through which the performance appraisal process can be interpreted—not as an isolated administrative process, but as an interconnected system of goal alignment, personal growth, and institutional development.

In conclusion, this study contributes to the academic dialogue surrounding faculty performance management by offering evidence-based insights into how teaching behaviors, feedback processes, and strategic optimization converge to shape appraisal systems. The findings carry both theoretical and practical implications for policymakers and institutional leaders seeking to refine evaluation frameworks in higher education. A well-calibrated appraisal system should not only assess output but also reflect input quality and process design—ensuring that teaching excellence and developmental feedback are rewarded through optimized mechanisms. Future research may explore longitudinal effects or extend the model to other provincial contexts, enriching understanding of performance management as a continuous and adaptive system.

8.LIMITATION AND SUGGESTIONS FOR FUTURE RESEARCH

Despite yielding robust findings, this study is subject to several limitations that should be acknowledged. First, the data collection was conducted exclusively in Heilongjiang Province, China, focusing on 39 higher education institutions. While stratified sampling was employed to enhance representativeness, the geographic and institutional concentration may limit the generalizability of the results to other regions or educational systems. Differences in policy structures, institutional culture, or resource allocations in other provinces may lead to divergent outcomes.

Second, the study employed a cross-sectional research design, capturing data at a single point in time. This limits the ability to infer causality or observe developmental trends within the performance appraisal processes. Longitudinal studies may offer deeper insights into how teaching behaviors, feedback mechanisms, and optimization strategies evolve and influence faculty appraisal perceptions over time.

Third, although validated measurement scales and structural equation modeling were used, all data relied on self-reported questionnaires. This introduces potential risks of social desirability bias or common method variance. Incorporating mixed-method approaches, such as interviews or performance records, could enrich the data quality and enhance the explanatory power of future models.

Fourth, the conceptual framework focused primarily on cognitive and structural elements of performance appraisal systems. Emotional, psychological, and interpersonal dynamics—such as teacher well-being, organizational trust, or peer collaboration—were not examined. Future research could expand the model to integrate these softer dimensions for a more holistic understanding of appraisal systems in higher education.

In summary, while the present study offers important contributions, future research should consider wider geographic samples, longitudinal designs, multi-source data, and enriched conceptual models to build on the current findings and extend their theoretical and practical applicability.

REFERENCE

1. Aminatu, O., Kyeraa, A., & Opoku, V. (2023). The efficacy of performance appraisal systems in educational institutions: Insights from the Jaman North District of Ghana. International Journal of Multidisciplinary Studies and Innovative Research, 12(4), 55–66.
2. https://ijmsirjournal.com/index.php/ojs/article/download/174/244/420
3. Greene, A., & Popovski, M. (2022). An evaluation of quality metrics for distance and blended
4. teaching. In Improving the Evaluation of Scholarly Work (pp. 145–162). Springer. https://doi.org/10.1007/978-3-031-17662-3_10
5. Liu, Y., & Xia, Y. (2023). Evolution, problems and optimization paths of university teacher performance appraisal systems in China. Educational Measurement and Evaluation, (6), 1–12.
6. https://mp.weixin.qq.com/s?__biz=Mzg2NzcxMjY5Mw==&mid=2247489261&idx=1& sn=d129a75e84dc531c2c39e65378bcf5ff
7. Eccles, J. S., & Wigfield, A. (2023). Expectancy-value theory to situated expectancy-value theory.
8. Motivation Science, 9(1), 1–12.
9. Permzadian, V., & Shen, T. (2024). Assessing the predictive validity of expectancy theory for academic performance. BMC Psychology, 12(437).
10. Achaa, L. O. (2023). PERFORMANCE APPRAISAL SYSTEM AND TEACHER

11. EFFECTIVENESS IN PUBLIC BASIC SCHOOLS IN GHANA. International Journal of Management & Entrepreneurship Research, 5(6),
12. 386-404.https://doi.org/10.51594/ijmer.v5i6.498
13. Mazhar, S. (2015). Efficacy of faculty performance appraisal system in higher educational organization. International Journal in Management & Social Science, 3(1), 36-45 Lv, X., & Yu, Y. (2013). The Performance Appraisal Research on Higher School Teachers' Working Behavior. In 2013 International Conference on the Modern Development of Humanities and Social Science (pp. 107-111). Atlantis Press.
14. Yang, Q. (2017).Research on Performance Evaluation of Teachers in Applied Universities:Take the British University of Bolton for Example. Research in Educational Development(07), 58-63. doi:10.14121/j.cnki.1008-3855.2017.07.011.
15. Anjum, A., Yasmeen, K., & Khan, B. (2011). Performance appraisal systems in public sector universities of Pakistan. International journal of human resource studies, 1(1), 41.DOI:
16. 10.5296/ijhrs.v1i1.851
17. Rasheed, M. I., Yousaf, H. D. A. S., & Noor, A. (2011). A critical analysis of performance appraisal system for teachers in public sector universities of Pakistan: A case study of the Islamia University of Bahawalpur (IUB). African journal of business management, 5(9), 3735.
18. Lin,C.L.(2016).A Study about The Improvement of Teacher's Performance Evalution System in Application-oriented College——A Case Study of Quanzhou Institute of Information
19. Engineering College (Chinese Master's Theses Full-text Database,HUAQIAO UNIVERSITY).https://kns.cnki.net/KCMS/detail/detail.aspx?dbname=CMFD201701&f ilename=1016918483.nh
20. Liu, Y., & Fang, Y. (2023). Optimization of College Teachers' Performance Management Using
21. Artificial Intelligence Technology. Computational Intelligence and
22. Neuroscience, 2023.https://doi.org/10.1155/2023/4203776
23. Peng, J. (2022). Performance Appraisal System and Its Optimization Method for Enterprise
24. Management Employees Based on the KPI Index. Discrete Dynamics in Nature and Society, 2022.https://doi.org/10.1155/2022/1937083
25. Cui, G. C.,Jiang, J., & Lv, Z. Y. (2022).Exploring the Current Situation and Optimization of Teachers' Performance Appraisal in Colleges and Universities--Taking Nanjing H University as an Example.China University Science & Technology(08),51-55.
26. doi:10.16209/j.cnki.cust.2022.08.023.
27. Zheng,Y & Sun C. (2022).Construction Scheme of Quantitative Assessment of College Teachers'
28. Performance Based on Big Data Analysis.Mobile Information
29. Systems,2022,1-10.https://doi.org/DOI10.1155/2022/8373164 Vroom, V. H. (1964). Work and motivation. Wiley.
30. Martins van Jaarsveld, G., Wong, J., Baars, M., Specht, M., & Paas, F. (2025, January). Goal setting in higher education: how, why, and when are students prompted to set goals? A systematic review. In Frontiers in Education (Vol. 9, p. 1511605). Frontiers Media SA.
31. Heintalu, K., Saks, K., Edisherashvili, N., & Dekker, I. (2025). The conceptualisation of goal setting and goal orientation in higher education: A systematic literature review. Educational Research Review, 100709.