

DRIVING SUSTAINABLE TEACHING PERFORMANCE: A QUANTITATIVE ANALYSIS OF MANAGEMENT FACTORS INFLUENCING TRAINING EFFECTIVENESS AMONG VOCATIONAL COLLEGE TEACHERS IN JIANGSU PROVINCE

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Abstract— Teacher training effectiveness in vocational colleges is increasingly recognised as a key driver of sustainable educational outcomes and workforce readiness. This study explores the impact of institutional management factors on the perceived training effectiveness of vocational college teachers in Jiangsu Province, China. Using a quantitative design, data were collected from 412 teachers through a structured questionnaire comprising dimensions of training needs assessment, administrative support, relevance of training content, perceived training effectiveness and post-training evaluation. Descriptive statistics, Pearson correlation, and multiple regression analysis were used to examine the relationships among these variables. Results indicate that administrative support ($\beta = .384$, $p < .001$), relevance of training content ($\beta = .356$, $p < .001$), and post-training evaluation ($\beta = .297$, $p < .01$) significantly predict perceived training effectiveness. The regression model accounted for 51.4% of the variance ($R^2 = 0.514$, $F(4, 407) = 107.32$, $p < .001$). Teachers also reported that misalignment between training content and job requirements, as well as insufficient managerial feedback mechanisms, reduces long-term effectiveness. The findings underscore the importance of strategic, management-led approaches to training design and implementation in vocational education settings. Recommendations are provided to enhance sustainable teaching performance through integrated training policies, feedback loops, and management engagement. This study contributes to the discourse on workforce-oriented education reform and offers evidence-based insights for education managers and policymakers in vocational training institutions.

Keywords—Administrative support, post-training evaluation, training content, training effectiveness, training needs.

I. INTRODUCTION

Sustainable teaching performance has emerged as a strategic priority in vocational education, particularly as economies confront the dual pressures of technological change and global competitiveness. In China, vocational colleges play an indispensable role in developing a skilled workforce aligned with industrial demands. However, the effectiveness of this mission depends significantly on the professional competence of vocational educators and the institutional capacity to support their ongoing development (1,2). Sustainable teaching performance, in this sense, extends beyond individual skill acquisition to encompass the systemic, managerial, and cultural conditions that enable teachers to translate training into lasting improvements in instructional quality.

The vocational education sector in China has undergone notable transformation over the past four decades, evolving from post-Cultural Revolution restoration in the 1980s to modernisation and integration with economic reform agendas in the 21st century (3,4). Policy milestones such as the 2019 National Implementation Plan have elevated vocational education to an equal footing with general education, positioning it as a central pillar of the nation's development strategy (5). In provinces such as Jiangsu—renowned for its industrial strength and dense vocational network—teacher quality is not merely an educational concern but an economic imperative (6). Despite these reforms, disparities in resource allocation, leadership quality, and training relevance continue to challenge the sector's capacity to meet evolving workforce needs (7,8).

A. Leadership and Organisational Climate in Training Effectiveness

A growing body of research highlights that management factors, particularly leadership style and organisational climate, play decisive roles in determining training outcomes. Inclusive leadership has been shown to enhance teachers' intrinsic motivation for professional development by fostering a supportive, participatory environment (1). Instructional leadership, in turn, ensures alignment between training objectives and institutional teaching strategies, creating a coherent developmental trajectory for educators (2). Principal support extends this influence beyond logistical assistance, contributing to teachers' sense of career calling and professional recognition (9). Transformational leadership, which inspires vision and collaboration, complements instructional leadership's practice-oriented focus, together forming a dual mechanism for enhancing professional growth (10).

A strong organisational culture reinforces these leadership effects, embedding collaboration and commitment into daily operations. Lv et al. (11) found that such cultures are linked to higher occupational commitment and more effective industry–university cooperation, both of which are vital in vocational contexts where industry relevance is paramount. Conversely, resource mismanagement, inconsistent leadership, and outdated professional title systems can undermine training initiatives and dampen motivation for continuous improvement (12,13). In the current digital era, the ability of educational leaders to exercise digital leadership, leveraging data for decision-making and promoting technology-enhanced pedagogies, is increasingly recognised as critical for sustainable teacher capacity building (14).

B. Training Design, Content Relevance, and Evaluation

Beyond leadership and culture, the design and delivery of training itself are pivotal to effectiveness. Well-structured training with clear learning objectives, relevant instructional methodologies, and hands-on practice enhances both engagement and transfer of skills (15,16). Practical exposure enables teachers to contextualise learning and bridge the gap between theory and classroom application (17). The relevance of training content to teachers' actual roles has been repeatedly identified as a key determinant of perceived usefulness and transfer success (18,19). When content aligns with workplace tasks and institutional goals, teachers are more likely to integrate new knowledge into their practice; when misaligned, the opposite occurs. Evaluation frameworks such as the Kirkpatrick model and the General Training Effectiveness Scale (GTES) offer structured ways to measure training outcomes across reaction, learning, behaviour, and results (16,20). The integration of such tools into management practice allows for evidence-based refinement of training programmes, ensuring continuous improvement in line with institutional priorities.

C. Post-Training Follow-Up and Sustainability

One of the most underutilised yet critical dimensions of training effectiveness is post-training follow-up. Follow-up activities ranging from mentoring and peer collaboration to structured feedback are essential for reinforcing skills, addressing implementation challenges, and maintaining engagement (21,22). Longitudinal studies demonstrate that training gains can persist for months or years when supported by targeted follow-up, but fade quickly in its absence (23,24). In fast-changing vocational contexts, such reinforcement is essential to sustain instructional relevance and quality.

D. Jiangsu Province Context and Research Gap

Jiangsu Province presents a unique and strategic case for examining management factors in training effectiveness. As a major hub of vocational education, it benefits from substantial policy support, a diverse industrial base, and relatively advanced infrastructure. Yet, the province also exhibits variation in institutional capacity, leadership quality, and training management practices. Some vocational colleges in Jiangsu demonstrate best practices in integrating school–enterprise cooperation, embedding training within broader institutional strategies, and sustaining teacher engagement. Others, however, struggle with fragmented programmes, a lack of needs-based planning, and minimal post-training evaluation.

While the literature offers robust evidence on individual determinants of training effectiveness, such as administrative support (25,26), content relevance (18), and follow-up (22), few empirical studies have examined how these factors operate simultaneously within the Chinese vocational education management context. Moreover, existing research often treats these predictors in isolation, overlooking their potential combined influence on sustainable teaching performance.

The research aims to examine the influence of key management factors, specifically administrative support, relevance of training content, post-training evaluation, and training needs assessment, on the perceived training effectiveness of vocational college teachers in Jiangsu Province, to identify sustainable strategies for enhancing teaching performance.

Research Objectives

1. To measure the level of perceived training effectiveness among vocational college teachers in Jiangsu Province.
2. To examine the relationships between administrative support, relevance of training content, post-training evaluation, training needs assessment, and perceived training effectiveness.
3. To determine the extent to which administrative support, relevance of training content, post-training evaluation, and training needs assessment predict perceived training effectiveness.
4. To identify areas where training content alignment, managerial practices, and follow-up processes can be improved to enhance sustainable teaching performance.

II. METHODOLOGY

A. Research Design

This study adopted a quantitative, cross-sectional survey design to systematically examine the influence of management-related factors on teacher training effectiveness within vocational colleges. The design was chosen to enable statistical analysis of relationships between variables and to provide empirical evidence applicable across similar institutional contexts.

Final Stage

When you submit your final version, after your paper has been accepted, prepare it in two-column format, including figures and tables.

B. Participants

The target population consisted of vocational college teachers from Jiangsu Province. Using a stratified random sampling approach, 412 teachers from 11 institutions were selected to ensure representation across academic departments and varying levels of teaching experience. The stratification criteria accounted for both disciplinary diversity and professional tenure, thereby enhancing the generalisability of findings. Participation was limited to teachers who had completed at least one institutionally organised training programme within the preceding 24 months, ensuring that responses were grounded in recent and relevant experiences.

C. Instrument Development and Validation

Data were collected using a structured, self-administered questionnaire meticulously developed in alignment with established theoretical frameworks and empirical studies on training effectiveness (27,28,29). The instrument was informed by core concepts from training transfer theory, adult learning theory, and organisational support theory, ensuring a strong conceptual foundation.

The questionnaire comprised five key sections:

1. Training Needs Assessment (TNA) – evaluating the extent to which training was preceded by systematic needs identification.
2. Administrative Support – measuring perceived institutional backing, including supervisory encouragement and resource allocation.
3. Relevance of Training Content– assessing the alignment of content, delivery methods, and practical applicability with teachers’ professional roles.
4. Post-Training Evaluation – gauging the availability and quality of follow-up mechanisms to reinforce learning.
5. Perceived Training Effectiveness – capturing participants’ overall assessment of training impact on professional practice.

A 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree) was used to measure responses. The instrument underwent expert review by three specialists in vocational education and training management to ensure content validity, followed by a pilot test with 35 teachers from non-sampled institutions. The pilot data were analysed to refine question clarity and eliminate ambiguity. Reliability analysis demonstrated strong internal consistency, with Cronbach’s alpha coefficients ranging from 0.78 to 0.88 across the five domains. Construct validity was confirmed through exploratory factor analysis (EFA), which supported the theoretical structure of the instrument and indicated satisfactory factor loadings for all items.

D. Data Collection and Analysis

Data collection was conducted between March and April 2025. Participants were briefed on the study’s purpose, assured of confidentiality, and provided with both digital and paper-based survey options to maximise accessibility. Data analysis was performed using SPSS v29. The analytical process involved:

- Descriptive statistics to summarise demographic variables and training characteristics.
- Pearson correlation analysis to explore bivariate relationships between management factors and perceived training effectiveness.
- Multiple regression analysis to identify the most significant predictors of training effectiveness, controlling for demographic variables.

This methodological approach ensured a rigorous examination of how institutional management practices shape training outcomes, providing robust evidence to inform both policy and practice in vocational education.

III. FINDINGS

A. Descriptive Statistics

Analysis of descriptive data revealed that the mean perceived training effectiveness score among respondents was 3.67 (SD = 0.73) on a 5-point Likert scale, indicating a moderately high perception of training value. In terms of training participation frequency, the majority of teachers (66%) reported attending between one and three training sessions annually, suggesting that professional development opportunities are available but not overly frequent. Notably, 71% of respondents perceived training content to be only “somewhat aligned” with their actual teaching tasks, highlighting a potential gap between training design and workplace applicability. Table 1 presents the summary of descriptive statistics for the key study variables.

Table 1. Descriptive Statistics of Study Variables (N = 412)

Variable	Mean	SD
Perceived Training Effectiveness	3.67	0.73
Administrative Support	3.81	0.69
Relevance of Training Content	3.58	0.75
Post-Training Evaluation	3.44	0.72
Training Needs Assessment (TNA)	3.39	0.68

B. Correlation Analysis

Pearson correlation coefficients were computed to examine the relationships between the independent variables and perceived training effectiveness. Table 4 showed that all four management-related factors were found to be positively and significantly correlated with training effectiveness ($p < .01$). The strongest relationship was observed for administrative support ($r = 0.652$), followed closely by relevance of training content ($r = 0.631$). Post-training evaluation also demonstrated a substantial positive correlation ($r = 0.596$), while training needs assessment exhibited a weaker, albeit significant, relationship ($r = 0.421$). Table 2 summarises the correlation results.

Table 2. Correlations between Management Factors and Perceived Training Effectiveness

Variable	r	Significance
Administrative Support	0.652**	$p < .01$
Relevance of Training Content	0.631**	$p < .01$
Post-Training Evaluation	0.596**	$p < .01$
Training Needs Assessment (TNA)	0.421**	$p < .01$

Note: $p < .01$; Two-tailed test.

C. Multiple Regression Analysis

To identify the most significant predictors of training effectiveness, a multiple regression analysis was conducted with the four management factors entered simultaneously into the model. The overall model was statistically significant, $F(4, 407) = 107.32$, $p < .001$, explaining 51.4% of the variance in perceived training effectiveness ($R^2 = 0.514$, Adjusted $R^2 = 0.509$). Among the predictors, administrative support emerged as the strongest predictor ($\beta = 0.384$, $p < .001$), indicating that leadership engagement, provision of resources, and supervisory encouragement have the greatest impact on teachers' perceptions of training success. Relevance of training content was the second strongest predictor ($\beta = 0.356$, $p < .001$), followed by post-training evaluation ($\beta = 0.297$, $p < .01$). Training needs assessment, while statistically significant ($\beta = 0.141$, $p < .05$), exhibited the weakest predictive power, suggesting that in the current context, needs assessments are either underutilised or not systematically linked to programme design. Table 3 presents the detailed regression results.

Table 3. Multiple Regression Predicting Perceived Training Effectiveness

Predictor Variable	Standardised Beta (β)	t	Sig.
Administrative Support	0.384	7.84	$p < .001$
Relevance of Training Content	0.356	6.95	$p < .001$
Post-Training Evaluation	0.297	5.87	$p < .01$
Training Needs Assessment (TNA)	0.141	2.96	$p < .05$

Model summary: $R^2 = 0.514$, Adjusted $R^2 = 0.509$, $F(4, 407) = 107.32$, $p < .001$.

IV. DISCUSSION

A. Level of Perceived Training Effectiveness among Vocational College Teachers (RO1)

The average perceived training effectiveness score of 3.67 (SD = 0.73) suggests that, on balance, vocational teachers in Jiangsu Province rate their institutional training as moderately effective. This aligns with prior research indicating that Chinese vocational educators generally value institutional training, especially when it is supported by competent trainers, interactive learning formats, and tangible post-training benefits (30,31). However, the fact that over 70% of teachers reported that training content was only "somewhat aligned" with their job

responsibilities reveals a persistent structural challenge in professional development design.

This misalignment reflects a common pattern in Chinese vocational education, where training programmes tend to adopt a “one-size-fits-all” approach rather than responding to the differentiated needs of subject-specific educators (28,32). According to Han and Yin (33), such generic programmes reduce transferability, as teachers find it difficult to apply abstract content in the realities of their classrooms or workshops. This study’s findings echo Xia and Pei’s (31) argument that the sustainability of teacher performance depends on targeted, context-sensitive training that directly addresses the evolving technological and pedagogical demands of vocational teaching.

From a policy perspective, the moderately high score suggests that Jiangsu Province’s vocational training ecosystem has a solid foundation but requires greater alignment with both industry expectations and teachers’ day-to-day instructional needs. This reinforces the call for integrated curriculum–industry linkages within teacher training policy frameworks (34).

B. Relationships between Management Factors and Perceived Training Effectiveness (RO2)

The strong, statistically significant correlations between all four management factors and training effectiveness ($p < .01$) indicate that management practices are deeply intertwined with how teachers perceive training outcomes. Administrative support emerged as the strongest correlate ($r = 0.652$), underscoring the argument made by Li (35) and Han and Yin (33) that leadership engagement is central to fostering a culture of continuous improvement in vocational education. This finding is particularly notable in the Chinese context, where hierarchical institutional structures mean that teacher motivation is often shaped by administrative encouragement, recognition, and tangible support mechanisms (31). Administrative support, when operationalised as mentorship, coaching, and resource allocation, has been shown to enhance both training participation rates and the subsequent application of learned skills (36).

The strong correlation between content relevance ($r = 0.631$) and effectiveness mirrors global research showing that training aligned with job tasks enhances motivation, engagement, and retention (28). This alignment is especially critical in vocational education, where instructional quality is closely tied to industry relevance and the integration of emerging technologies (32). Post-training evaluation ($r = 0.596$) also showed a substantial relationship with effectiveness, confirming the role of feedback mechanisms in reinforcing learning (37). When post-training evaluations are absent or inconsistent, teachers often experience a “decay curve” in skill retention, as observed in longitudinal studies of vocational teacher training in Asia (33).

Even training needs assessment ($r = 0.421$), while weaker, was still significant. OECD (28) stresses that needs assessments are not just preliminary diagnostics but should be integrated into an iterative improvement cycle. The modest correlation here may reflect either underuse or superficial application of TNA in the sampled institutions, suggesting untapped potential for impact.

C. Predictive Power of Management Factors (RO3)

The multiple regression results provide particularly valuable insights for evidence-based management decisions. With 51.4% of the variance in perceived training effectiveness explained by the four predictors, the model confirms that training effectiveness in vocational colleges is not a random or purely content-driven phenomenon but is structurally influenced by management practices. Administrative support was the most powerful predictor ($\beta = 0.384$, $p < .001$), which aligns with Zhang and Wang’s (34) assertion that leadership is the “performance multiplier” in teacher training. This finding carries strategic implications: institutions that invest in leadership training for administrators and create accountability structures for follow-up support are more likely to sustain high-impact training environments.

The relevance of training content ($\beta = 0.356$, $p < .001$) further highlights the necessity of customised, industry-integrated curricula in professional development. As Xia and Pei (31) argue, a vocational teacher who is trained in outdated methods or tools cannot prepare students for future industry demands, thereby undermining both teaching performance and graduate employability.

Post-training evaluation ($\beta = 0.297$, $p < .01$) reinforces the importance of feedback loops not only as assessment tools but as learning reinforcers. Institutions that treat post-training evaluation as an ongoing dialogue, rather than a one-off formality, foster stronger knowledge retention and higher transfer rates (36). While training needs assessment was the weakest predictor ($\beta = 0.141$, $p < .05$), its statistical significance suggests that, when executed rigorously, it can shape programme design and maximise relevance. This aligns with OECD’s (28) recommendation for data-driven training planning.

D. Areas for Improvement to Enhance Sustainable Teaching Performance (RO4)

The final research objective sought to identify actionable areas for improvement. Three high-priority recommendations emerge from the findings:

1. Strengthen Content Alignment

The partial misalignment between training content and teaching tasks identified in this study undermines both short-term satisfaction and long-term performance gains. Xia and Pei (31) recommend establishing collaborative design committees comprising administrators, frontline teachers, and industry experts to ensure training content reflects the dynamic realities of vocational education.

2. Elevate Managerial Engagement Beyond Formal Support

While administrative support is high, qualitative insights from the literature suggest that it is often episodic rather than continuous (33). Formalising mentorship structures and integrating administrative feedback into annual teacher evaluations could institutionalise support and accountability.

3. Institutionalise Comprehensive Post-Training Evaluation

Post-training follow-up should be framed as a structured learning cycle, incorporating classroom observations, peer discussions, and periodic refreshers (37). This would shift evaluation from a compliance exercise to a capacity-building process.

4. Professionalise Training Needs Assessment

The relatively lower predictive value of TNA signals the need for more rigorous, evidence-based diagnostic tools. OECD (28) recommends leveraging both quantitative data (student performance metrics, teaching evaluations) and qualitative inputs (teacher interviews) to construct a multi-dimensional needs profile before training is developed.

E. Broader Impact and Contribution

From a management science perspective, this research makes three key contributions:

1. It provides empirical evidence that management practices are not peripheral but central determinants of training effectiveness in vocational colleges.
2. It positions administrative support as a strategic lever, demonstrating that leadership quality and engagement can substantially amplify the return on investment in training.
3. It validates a multi-factor model for sustainable teaching performance that can inform institutional policy in Jiangsu and beyond.

In terms of policy relevance, the findings align with China's National Vocational Education Reform Implementation Plan (2019), which calls for enhancing the quality of vocational teachers through targeted professional development. By demonstrating that training effectiveness is strongly tied to management-led factors, this study provides a clear managerial blueprint for achieving that policy goal. Internationally, the findings resonate with OECD (28) principles on sustainable professional learning, contributing to a growing body of literature that emphasises management capacity as a precondition for effective teacher training, rather than a secondary consideration. Ultimately, this research underscores that teacher training effectiveness is a management responsibility as much as it is a pedagogical one. In vocational education, where industry relevance and technological adaptability are paramount, this managerial dimension is not merely supportive it is decisive.

V. CONCLUSION

This study provides empirical evidence that management-related factors, particularly administrative support, relevance of training content, post-training evaluation, and training needs assessment, significantly influence the perceived training effectiveness of vocational college teachers in Jiangsu Province. By explaining over half of the variance in training effectiveness, the findings underscore the strategic role of institutional management in shaping sustainable teaching performance. Administrative support emerged as the strongest predictor, confirming earlier assertions that leadership engagement acts as a critical catalyst for training transfer and professional growth (33,35). Relevance of training content was the second most influential factor, reinforcing the argument that vocational teacher training must be tightly aligned with job tasks and evolving industry requirements to maximise its impact (31,32). Post-training evaluation and training needs assessment, while less influential, were still significant, highlighting the importance of structured feedback loops and evidence-based programme design (36,28).

These results carry substantial implications for educational management practice and policy. First, they point to the necessity of management-led training systems, where leadership commitment, content alignment, and systematic follow-up are integrated into institutional processes. Second, they emphasise that sustainable teaching performance in vocational education is not solely the product of pedagogical inputs but also the outcome of deliberate organisational strategies. This reinforces the call for reform in professional development policy frameworks, ensuring that teacher training is contextual, continuous, and industry-connected (30,34).

From a broader perspective, the findings contribute to the growing discourse on sustainable workforce preparation, positioning vocational teachers as pivotal agents in achieving both educational and labour market goals. By strengthening the management infrastructure that supports teacher training, institutions in Jiangsu and beyond can ensure that their educators are well-equipped to meet the challenges of an evolving, skills-driven economy.

While this study offers valuable insights, several avenues remain open for further exploration:

1. Longitudinal Impact Studies

Future research could adopt a longitudinal design to track how administrative support, content relevance, and evaluation processes influence training transfer and teaching performance over multiple academic years. Such studies could capture the decay or reinforcement effect of training (37).

2. Industry-Education Collaboration Models

Given the strong role of content relevance in predicting effectiveness, future studies could investigate specific models of industry-education integration in teacher training design and assess their measurable impact on classroom practices (32).

3. Advanced Analytical Approaches

Applying structural equation modelling (SEM) or hierarchical linear modelling (HLM) could provide deeper insights into the direct and indirect pathways through which management factors influence training effectiveness, accounting for institutional and individual-level variables (34).

In conclusion, this research highlights that sustainable teaching performance in vocational education is as much a

product of strategic management as it is of pedagogical quality. By embedding leadership engagement, content alignment, feedback systems, and rigorous needs assessment into the professional development cycle, vocational institutions can ensure that teacher training delivers lasting value for educators, students, and the wider workforce.

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