Education Training, Principal's Supervision and Teacher Performance in Higher Vocational Colleges in China: Mediated by Teacher Competency

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Abstract

This research delves into the complex interconnections among education training, principal supervision, teacher competency, and teacher performance in higher vocational colleges situated in the Western Guangdong region of China. In light of the growing significance placed upon educational quality and outcomes, it becomes imperative to comprehend the intricate dynamics inherent within these variables. Employing a comprehensive mixed-methods framework, encompassing both quantitative surveys and qualitative interviews, the researchers gathered data from a diverse cohort of participants, comprising teachers, principals, and educational administrators. The results of the study demonstrate a noteworthy mediating influence of teacher competency in the association between principal's supervision and teacher performance, as supported by statistical significance. Moreover, this research delves into the examination of the prospective nature of educational training in relation to the development of teacher competence, which subsequently impacts teacher performance through the intermediary function of competence. This study serves as a valuable contribution to the existing body of knowledge by shedding light on the intricate dynamics that exist between education training, principal's supervision, teacher competency, and teacher performance. By focusing specifically on the context of higher vocational colleges in China, this research offers valuable insights into the underlying mechanisms that foster educational excellence within this distinct educational setting.

Keywords: Education Training; Principal's Supervision; Teacher Performance; Higher Vocational Colleges; Teacher Competency

Introduction

Teacher performance refers to the achievements made by teachers in performing their duties or work according to the standard abilities and standards of their work in a certain period of time (Jawad, Raheem & Majeed, 2021). Teachers are an important part of the education system, so their performance needs to be considered. A variety of learning theories and research findings indicate that student academic achievement is largely determined by a teacher's ability to impart meaningful learning in the classroom. A teacher's performance in instructing students is used to measure this ability. Therefore, teacher performance becomes a key variable in learning management to ensure that students have a meaningful learning experience (Effiyanti,

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Sukirno, Widihastuti & Retnawati, 2023). Principals and teachers play an important role in improving students' intellectual, personality and psychosocial development (Safrida, Tannady, Solissa, Sapulete and Al Haddar, 2023; Capone, Joshanloo & Sang-Ah Park, 2023). In order to guarantee good teaching quality, highly qualified teachers are needed, especially in the field of higher education (Taengetan, Masengi & Tumbel, 2023).

Teacher performance is an important quality indicator for colleges evaluation from the Ministry of Education. Therefore, colleges and universities generally adopt the way of performance appraisal to evaluate teachers, hoping to gain a higher appraisal from the relative departments (Van Waeyenberg, Peccei & Decramer, 2022). Teacher performance appraisal is a kind of teacher appraisal system for deepening the reform of educational personnel system, promoting the smooth implementation of school performance salary system, strengthening the construction of teachers and promoting the scientific development of education (Wan & Jin, 2021) and it is a systematic process that leads the right direction for the future work, therefore, it has been very important and necessary for many educational policy reforms (Chan, 2023).

The Government has launched many policy reforms to improve the competence and performance of teachers through various education, training and seminars in the nearest five years (Fitria & Kristiawan, 2023), including the recent document "Circular of the General Office of the Ministry of Education on Actions to Improve the Competence of Teachers in Vocational Education" (Teacher's Office Letter [2022] No. 8), Notice of the Ministry of Education of the People's Republic of China on Implementing the Plan for Improving the Quality of Teachers in Higher Vocational Colleges (2021-2025). This education training has also shown positive results associated with improving teacher competency and influencing the quality of teacher performance (Dahyani, Arafat & Furqan, 2023; Fitria and Kristiavan, 2023). Various types of training are designed to broaden teachers' horizons, enhance their experience, and apply it to teaching activities, thereby influencing the teaching professionalism of the teachers (Patino, Ramirez-Montoya & Buenestado-Fernandez, 2023).

Vocational education still faces many problems, such as how to adapt to the development needs of the intelligent era and how to train high-quality technical personnel (Pang, Yuan & Li, 2023; Chen, 2022). According to the results of monitoring, evaluation, and supervision of supervisors at the level of educational units, the qualification rate of teachers in the teaching and assessing process is not high, and the results of teacher ability test are low (Indrayogi & Sofyan, 2023). Although the selection and training of teachers have improved and national standards for teachers exist, the underperformance of teachers poses a huge challenge for principals and administrators at all levels of education (Miller, 2022; Cibane, 2020). Not only do poorly performing teachers fail to achieve the expected results, but their behavior may also have detrimental effects on the work of others (Ikhide, Timur & Ogunmokun, 2022). They consume a lot of school leaders' time and occupy positions that could be filled by better-performing teachers (Larsson Taghizadeh, 2023; Yigzaw, 2022). Their incompetent performance also tarnishes the school's reputation - often eliciting angry reactions from parents (Caruso, 2022). Underperforming teachers not only fail to meet their own performance standards, but also affect the performance of those who come into contact with them, such as other staff and students (Liebowitz, 2022). Poor teacher performance can negatively impact a school's reputation and social standing, student learning and achievement, the

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performance of other teachers, the performance of support staff, leading and managing the school (Iines, Sami, Vesa and Hannu, 2023; Wu & Zhang, 2023; Meter,2023).

The number of professional teachers in education training is insufficient, the quality is not high, and the consciousness is not strong.(Naik, Deshpande, Shivananda, Ajey& Manjunath Patel, 2021).The teacher training system of teacher education colleges and universities is not perfect, which seriously lags behind the challenges brought by the professionalization, science and informatization of teacher training.(Tatto, 2021).The ability to solve the problems existing in the construction of rural teachers still needs to be improved.(Pambudi & Harjanto,2020).The academic foundation of education and training is weak, and the status of academic disciplines needs to be established urgently.(Dodd, Dadaczynski, Okan, McCaffery & Pickles, 2021).

The current problem facing developing countries is the uneven and low level of teacher capacity (Li, 2023; Cruz-sandoval et al., 2023). Teacher competency is related to the quality of teachers' performance in teaching (Dahyani, Arafat & Furqan, 2023; Casinillo, 2023). The problem of teacher competency in China shows quite high numbers of teachers who are not prepared to learn (Lau, Shum, Man & Dadaczynski, 2022) and are not prepared to learn methods. Learning media and Learning Assessment (Azizah, Widjanarko, Darmanto & Pratama, 2022). In addition, less than 20% of teachers participated in essay writing activities; Research; Creating artistic/technological works; Research books; Attend class; Attend training; Participation in scientific forums (Tome & Abreu, 2022). These problems appear in higher vocational colleges and become national problems (Liu & Yan, 2023). The quality of some teachers in China still falls short of expectations. Low academic and non-academic achievement of students is a problem we often encounter (Wang, Kang, and Gao, 2023). Because educators are not prepared and unable to maximize the activities of the teaching process, it is difficult to find teachers in the field of education who can teach to the best of their ability (Tsabitah & Fitria, 2021). According to the background, current situation and problem statement of teacher performance in higher vocation colleges in China, this research aims to study the Education Training, Principal's Supervision and Teacher Performance In Higher Vocational Colleges In China: Mediated By Teacher Competency

Literature Review

Teachers and their sector managers need to be able to identify factors of under-performance as the first stage in the process of restoring and restoring professionally acceptable standards of individual teacher performance (Sanganal, 2019). This includes consideration of national standards for effective performance and Ofsted standards for unsatisfactory and unsatisfactory teaching, plus consideration of different types of ineffective teaching and an analysis of the location of factors that contribute to ineffective or unsatisfactory performance (Riordan, 2022).

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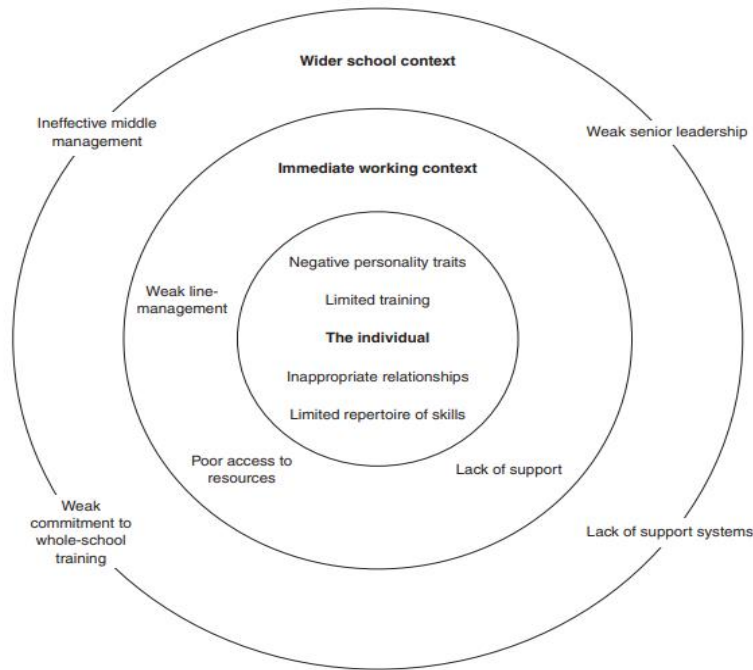
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Figure 1: Major influences on teachers' under-performance

The full potential of performance management reviews is to support the development of some teachers and reverse the under-performance of others (Kirkpatrick et.al., 2023). The statutory performance management processes for teachers are designed to : Focus on more effective teaching and leadership for the benefit of students, teachers and schools; Help raise standards; Improve teachers' job satisfaction, cultivate teachers' professional quality and professional skills; Develop a framework for teachers and their leaders to agree and review priorities and objectives within the overall framework of the school Improvement Programme; Support teachers by ensuring regular professional discussions with their team leaders about their work and professional development (Li, Cai & Tang, 2023; Ko & Kim, 2023; Abu-Tineh, Romanowski & Alshaboul, 2023; Niyamabha, Wichitpatcharaporn & Khamkhrueang, 2023).
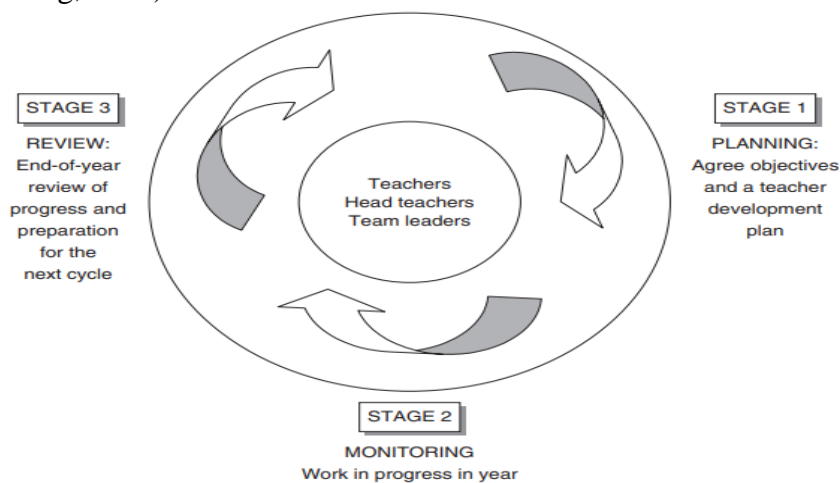
Figure 2: The performance management cycle (adapted from DfEE, 2000)

Aswinda, Siraj & Saprin (2019) explored the influence of principal supervision on teachers' pedagogic competencies in Sopen County public primary school by using quantitative methods and associated post hoc design to explain research

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questions. In this study, 13 teachers at Public Primary School No. 237 in Aletellue City were studied. The results show that the principal's supervision had a positive impact on improving teachers' pedagogic competencies, which can be seen in every activity carried out by teachers who are able to improve their creative and innovative abilities. Lorensius, Anggal & Lugan (2022) identified and analyzed the implementation of academic supervision in improving teachers' professional competence. Observation methods and interview method were used to collect data. The results showed that principal academic supervision can help, guide, and motivate teachers to improve their professional competence. Through a systematic and well-planned supervisory process, teachers are able to fully integrate and use their various abilities to learn through peer input. Supervisors and teachers can also understand the importance of academic supervision in improving teachers' professional competence.

Syukri, Viona & Utama (2023) determined the impact of principal's supervision on teacher competency in improving the quality of education. This study adopted qualitative literature research method. All articles supporting academic supervision, teacher competency, and school quality data were used as ancillary data. The results of this study indicated that principal's supervision have an impact on teacher competency. Devi, Harapan & Wardiah (2021) further explored the role of principal's supervision through the lens of the principal's role in promoting teacher professionalism. The research tools were interview list, observation list and literature research. The results showed that the principal's work plan to train teachers had a positive effect on teachers' competence. Nurhayati, Mesiono & Daulay (2022) determined the impact of principal academic supervision and teacher performance satisfaction on improving teacher ability. The hypothesis was that there was a positive and high relationship between the academic supervision of the principal and the co-job satisfaction of the teacher's teacher competency. The results showed that the influence shown by R2 square index = 0.431, which means that academic supervision and teachers' job satisfaction together affect 43.1% of teachers' teaching ability.

In order to certify the impact of teacher development programs on teacher performance after education training, some researchers made efforts to investigate the the relationships between education training and teacher performance. Bastian, Nasution & Wahyuni (2022) explored the effects of training on teacher performance. Multiple linear regression was used for quantitative analysis. The sample was 64 teachers, and proportional random sampling was used. The results showed that training had a significant impact on teacher performance. The test results showed that training, work motivation and teacher ability jointly affected teacher performance. Ehinola and Akomolafe (2022) also researched the relationship between education training and teacher performance with a sample size of 324 with two questionnaire tools, ITMSQ and TJPQ. The findings showed that education training programs are significantly correlated with teacher performance. Syafrina (2021) studied the impact of training on teacher performance in Pertanian Terpadu SMK in Negri, Riau Province. The study was carried out at the National Vocational School of Integrated Agriculture in Riau province. The sample of this study was selected from the entire population of 89 people. The results based on hypothesis testing showed that training had a significant effect on performance. The known contribution of training to performance was 37.7%, and the rest was explained by variables within variables that did not exist in this study.

Through the analyzing and literature reviews, we can conclude the following research gaps. To begin with, evidence from the literature review suggests that there

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is little focus on the mediating effect of teacher competency in the educational area though teacher competency is of great importance to teacher performance. Therefore, it is a gap for researchers to investigate and provide evidence to the study of teacher competency. When we search with the key word "teacher performance", there would be some research on how to manage teacher performance. Yet, most of the research used qualitative methods to study teacher performance through interview and observation. Few of the research provides empirical evidence to discuss teacher performance, which is a really gap for the researchers to find out the statistics and evidence on this research. Last but not least, the research of Chinese scholars on improving teacher performance through teacher competency mainly stays at the level of theoretical research, and there is no enough empirical research to clarify the influence of education training and principal's supervision on teacher performance with the mediating effect of teacher competency, making the literature from China lack of strong data support and empirical literature support. This is also a really research gap for Chines researchers.

Theoretical Review

This segment elaborates the relevant theories to teacher performance. Therefore, this section elaborates on the theory of teacher competency as the mediating effect on the relationship between education training, principal's supervision and teacher performance and other related theories. Transformation Leadership means that leaders make employees realize the importance of their responsibilities and tasks through leadership charm, leadership charisma, intellectual stimulation, and personalized care, and stimulate their needs at a higher level. So that they can maximize their own potential to achieve the highest level of performance. It was first put forward by Daudon, and began to be regarded as an important leadership theory from the classic book Leadership by political sociologist Burns. In his works, Burns described a leader as an individual who can motivate followers to better achieve the goals of leaders and followers, and then defined transformation leadership as a leader who inspires subordinates' high-level needs or expands subordinates' needs and desires by making employees realize the significance and responsibility of the tasks they undertake. Enable subordinates to override personal interests for the good of the team, the organization, and the greater political good.

Figure 3: Transformation Leadership Theory

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In education area, transformation leadership theory connects the roles of leaders and teachers, and tries to create a process between leaders and teachers that can improve the motivation and moral level of both sides. Leaders with transformation leadership set an example by their own behavior and care for teachers' needs to optimize the interaction of members within the schools. At the same time, through the joint creation and publicity of the school vision, the school creates an atmosphere of change, and promotes the adaptive change of the schools in the process of efficiently completing the teaching goals. Transformation leadership is very important to teacher competency. Principal leadership is an important external environmental factor that affects and alleviates teachers' competency. This theory used in this research is to explore the deep internal mechanisms of the influence of principal transformational leadership on teacher competency in the context of Chinese higher vocational college teachers (Tsang, Du & Teng, 2022).

Principals' change efforts encourage teachers to take leadership and expertise in teaching and learning, and principals also play a central and clear role in teaching and learning (Sebring & Bryk,2020). Transformational leaders bind themselves to values in the form of daily behaviors, and they always inspire school personnel to do more. Do something beyond their expectations (Bafadal, 2018).The role of transformational leadership in implementing school-based management Transformational leadership is a process in which leaders and followers inspire each other to create high levels of ethics and motivation related to their primary tasks and functions.(Smith & Squires, 2016).To improve organizational performance (Hallinger,2021), transformational school leaders focus on teachers' individual and collective understanding, skills, and commitment(Shengnan & Hallinger, 2021).

Research Methodology

Conceptual Framework

Figure 4 shows how the two independent variables are associated with teacher competency and teacher performance.
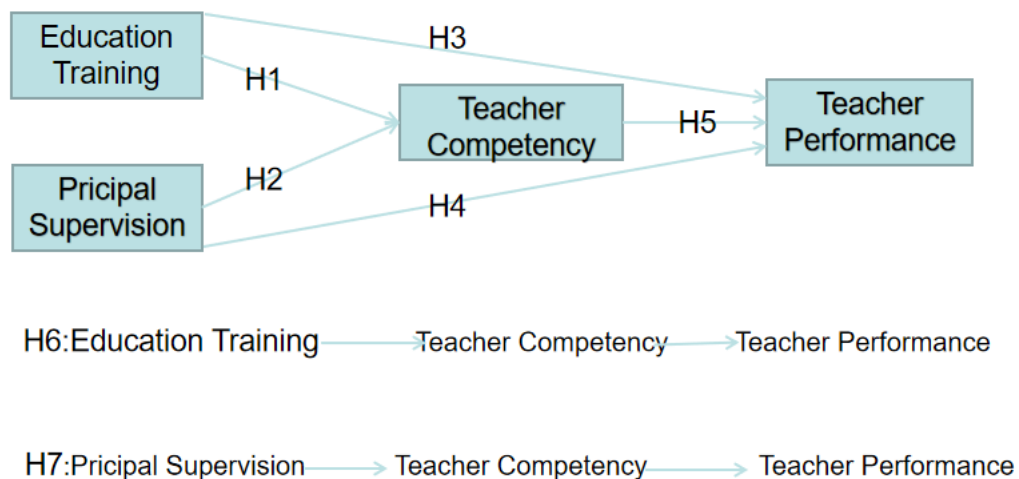

Figure 4: the conceptual framework (Source：Maritasari, Setyosari, Kuswandi, & Praherdhiono, H. (2020).

The researchers adopt a quantitative study design, in which questionnaires on how to improve teacher performance will be designed and the items with five-point

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Likert scale will be used to collect data, from strongly disagree to strongly agree. At the same time of testing the research hypothesis, a series of data analysis will be done through AMOS and comparison are carried out through quantitative methods to draw the conclusions among the variables. This study is mainly based on quantitative research methods, so the positive paradigm is the philosophy of this study, as the positive method can be viewed as a quantitative strategy for data collection and analysis (Bryman & Bell, 2004). The positivist approach ensures that research results are pure goals. Therefore, this research will be able to identify the influence of education training and principal's supervision on teacher performance. Quantitative research provides the empirical research basis for the measurement of teacher performance.

In this research, the main target group are teachers from higher vocational colleges in western Guangdong, China. They answered questionnaires about the influence of education training and principal's supervision on teacher performance through teacher competency. Questionnaires are randomly distributed among 1287 teachers who have experienced education training and teaching supervisions. The specific target groups were selected based on their working responsibilities and positions in their colleges to obtain valued information (Lohr, 2019). In this research, the simple random sampling technique is adopted among higher vocation colleges teacher in western Guangdong, China, who can feel and experience the management from college administration, including education training and principal's supervision. The sampling adopts the probability sampling technique according to teachers preference, experience, location and other factors.

Table 1: Sampling distribution from different organization

Name of Vocational Colleges	Population	Percent
Guangdong Maoming Health Vocational College	236	18.3%
Zhanjiang Preschool Normal College	259	20.1%
Yangjiang Vocational and Technical College	275	21.3%
Guangdong Maoming Preschool Teachers College	193	15%
Luoding Vocational and Technical College	172	13.3%
Yunfu Vocational College of Traditional Chinese Medicine	152	12%
Total	1287	100%

For this quantitative research, the total number of teachers in higher vocational colleges in western Guangdong, China are 1287. According to Krejcie & Morgan (1970), see figure 3.4 below, the sample size is 297. To verify, a calculation was also made by the sample size calculator by Raosoft Inc (2004) according to 95% confidence interval (e=0.05), with the population size (1287) , it is found that the sample size (n) is 297, which means 297 or more surveys are needed to have a confidence level of 95% that the real value is within ±5% of the surveyed value. The

collected data was analyzed using SPSS Version 26 software. Participants were selected by simple random sampling. In order to facilitate data collection, the questionnaire was made up of four copies and uploaded to Questionnaire Star. Once contact was made with the subject, the researcher contacted the participant via WeChat and sent the link to the participant. After completing the questionnaire, the needs of statisticians are clearly and easily presented.

SPSS-AMOS software was designed to analyze the quantitative data provided by the survey and find out the correlation between variables and invariants. There are several factors that can lead to bias in quantitative data analysis, such as data entry errors, response bias (random answers), sample selection methods, perceptions of participants' social attractiveness (such as personal experience), or personal attitudes (such as pairs) (Krathwohl, 2009, p. 331-332). These potential biases are expected to be taken into account in the design of the survey and analysis results.

Discussion

Normality Test

Sarstedt and Mooi (2019) proposed the Kolmogorov-Smirnov test and Shapiro-Wilks test, which aim to test normality by comparing the data to a normal distribution with the same mean and standard deviation in the sample. However, since these two tests are recommended for small samples less than 50 and only indicate whether the null hypothesis of normally distributed data should be rejected, they were not carried out in this study (grech&calleja, 2018). Instead, Hair et al. (2017) recommend checking Skewness and Kurtosis. When both Skewness and Kurtosis values are close to zero, the response pattern is considered to be a normal distribution. The general standard for Skewness is that if the statistic is greater than +1 or less than -1, it indicates a distribution bias. For Kurtosis, the general guideline is that if the statistic is greater than +1, the distribution is too peaked, and if the statistic is less than -1, the distribution is too flat. Therefore, Hair et al.(2017) determined that the distribution of Skewness and Kurtosis statistics in the range of -1 to +1 is considered to be a univariate normal distribution. Distributions with Skewness and/or Kurtosis values exceeding these criteria are considered non-normal distributions (Hair et al., 2017). Therefore, the calculation results of Skewness and Kurtosis are shown in Table 2

Variable	Item	skewness	kurtosis
	ET1	-0.901	0.302
	ET2	-0.870	0.373
ET	ET3	-0.969	0.763
	ET4	-0.624	0.107
	ET5	-0.750	-0.025
	PS1	-0.971	0.153
	PS2	-0.803	0.245
	PS3	-0.781	-0.282
PS	PS4	-0.963	0.228
	PS5	-0.875	-0.002
	PS6	-0.909	-0.046
TC	TC1	-0.493	-0.627

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	TC2	-0.689	-0.340
	TC3	-0.692	-0.275
	TC4	-0.807	-0.176
	TC5	-0.837	0.014
	TC6	-0.588	-0.552
	TP1	-0.625	-0.500
	TP2	-0.464	-0.947
TP	TP3	-0.719	-0.284
	TP4	-0.360	-0.688
	TP5	-0.595	-0.499
	TP6	-0.456	-0.690

Note: ET= Education Training; PS= principal's supervision; TC=Teacher Competency; TP= Teacher Performance

Table 2 indicates that all the items are univariately normally distributed as both Skewness and Kurtosis values are within +/-1. Hence, it indicates that this data set can be assumed to be distributed normal.

Assessment of Multicollinearity

Multicollinearity occurs when variables are highly correlated. It may be an indicator that variables measure the same thing (Klein, 2005). High multicollinearity affects the estimation error of small and medium-sized enterprises (Jagpal, 1982; Grapentine, 2000). There are several detection methods for multicollinearity, such as correlation matrix and variance inflation factor (VIF), etc. (Kaplan, 1994). In addition, the multicollinearity of the structure is verified by calculating the tolerance and variance expansion coefficient (VIF) of the structure. Tabachnick and Iidell (1996) believe that when the VIF value is greater than 10, it indicates that the model has a multicollinearity problem. In addition, Mansfield, and Helms, (1982) argue that the tolerance of collinearity statistics is another indicator of the multicollinearity problem, and it should be greater than 0.1 to get rid of the multicollinearity problem. SPSS software was used to diagnose covariance, and the tolerance and variance inflation factor (VIF) were calculated.

The results are shown in table 3, and all the VIF values are less than 1.7 and significantly below the threshold and tolerance are significantly above the threshold of 0.1.

Table 3: The Results of Multicollinearity Analysis

Construct	Collinearity Statistics	
	Tolerance	VIF
Education Training	0.664	1.506
principal's supervision	0.661	1.512
Teacher Competency		
	0.620	1.613

VIF= Variance Inflation Factor, the threshold level of multicollinearity VIF<5, Tolerant statistics>0.10

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Descriptive Statistics

Since a Likert-5 sub-scale is used as a more appropriate response format, the mean value of each construct should be in the range of 1-5 points, and the value of the neutral position should be 3 points. According to the summary of descriptive statistics given in Table 4.8, the analysis shows that education training (ET) is at an average level with the mean score and standard deviation (M=3.713, SD=0.95). Similarity, there was a moderate level of principal's supervision (PS) with a mean score and standard deviation (M=3.70, SD=1.028); and teacher competency (TC) with the mean score and standard deviation (M=3.81, SD=1.003); and teacher performance (TP) with the mean score and standard deviation (M=3.59, SD=1.004). It was found that the average mean and standard deviation scores were moderate to each of the constructs.

Table 4: Descriptive Statistics of the construct

Item	Min	Max	Mean	S.D.
ET1	1	5	3.72	1.127
ET2	1	5	3.70	1.084
ET3	1	5	3.74	1.062
ET4	1	5	3.74	1.015
ET5	1	5	3.70	1.154
ET (Average)	1	5	**3.713**	**0.950**
PS1	1	5	3.68	1.208
PS2	1	5	3.72	1.076
PS3	1	5	3.65	1.238
PS4	1	5	3.75	1.180
PS5	1	5	3.64	1.216
PS6	1	5	3.78	1.239
PS (Average)	1	5	**3.70**	**1.028**
TC1	1	5	3.64	1.181
TC2	1	5	3.73	1.180
TC3	1	5	3.76	1.210
TC4	1	5	3.87	1.189
TC5	1	5	3.88	1.153
TC6	1	5	3.55	1.239
TC(Average)	1	5	**3.81**	**1.003**
TP1	1	5	3.65	1.225
TP2	1	5	3.57	1.314
TP3	1	5	3.77	1.155
TP4	1	5	3.47	1.165
TP5	1	5	3.61	1.171
TP6	1	5	3.56	1.191
TP(Average)	1	5	**3.59**	**1.004**

Dimensions of the Variables

Exploratory Factor Analysis (EFA)

In this study, inter-item correlations for each variable were examined prior to CFA and SEM. The next section discusses the construction validity of constructs that

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use EFA for all variables. For a good factor analysis model, the items in the structure must be sufficiently related. The highest correlation for each item must be between 0.30 and 0.90. Anything below 0.30 indicates a lack of convergence, while anything above 0.90 indicates a lack of differentiation between projects. In factor analysis, the KMO value is used to test the adequacy of the sample. A KMO value greater than 0.70 is considered good (Hair et al., 2010). In addition, sphericity tests were performed to determine the correlation between the variables. As a rule of thumb, if the P-value is less than 0.05, it is considered appropriate for further factor analysis. The extracted total variance (TVE) must be at least 50% and the minimum factor load must be greater than 0.50. If all of these conditions are met, an average of the items can be calculated, saved, and used for further analysis (Hair et al, 2010). The results are given in the next section.

The Kaiser Meyer Olkin (KMO) and Bartlett's Test

KMO measures sample adequacy to determine whether the responses given along with the sample are adequate. Kaiser (1974) recommends 0.5 (KMO value) as a minimum (almost not accepted), values between 0.7-0.8 are acceptable, and values above 0.9 are excellent. Bartlett's test is another indication of the strength of the relationship between the variables. It tests the null hypothesis that the correlation matrix is an identity matrix (Chetty, Priya, 2015). An identity matrix is a matrix in which all diagonal elements are and all non-diagonal elements are close to 0, the null hypothesis need to be rejected. From the table 5, we can see that the KMO is .914, which is more than 0.9, indicating an excellent adequacy of the samples, hence, it is plausible to conduct factor analysis. Besides, it can be noticed that the Bartlett's Test Of Sphericity is less than 0.05, indicating the correlation matrix is not the identity matrix.

Table 5: KMO and Bartlett's Test of the Variables

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.914
Bartlett's Test of Sphericity	Approx. Chi-Square	4233.937
	df	253
	Sig.	.000

Analysis of Rotated Component Matrix

The rotating component matrix contains Pearson correlations between items and components, or "factors." These are called factor loading and allow us to interpret the characteristics that our components may reflect. Component 1 seems to reflect some kind of TP (Teacher Performance) trait. Component 2 is primarily related to the PS (principal's supervision) . Similarly, component 3 seems to measure TC (Teacher Competency) and Component 4 is related to ET (Education Training). These results suggest that perhaps components 1-4 reflect the true underlying characteristics. The table 4.15 we just examined shows the factor loading after the maximum rotation of the 4 components (or "factors").

Table 6: The Rotated Component Matrix

Rotated Component Matrix[a]

	Component			
	1	2	3	4
TP5	.836			
TP4	.824			
TP3	.785			
TP6	.783			
TP1	.763			
TP2				
PS1		.852		
PS2		.799		
PS5		.786		
PS6		.766		
PS4		.754		
PS3				
ET5			.845	
ET1			.820	
ET3			.770	
ET2			.708	
ET4				
TC4				.731
TC3				.714
TC5				.704
TC2				.658
TC6				.633
TC1				

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 5 iterations.

Reliability Analysis

The reliability of the measurement is an indication of the stability and consistency of the instrumental measurement concept and helps to evaluate the goodness of the measurement (Sekaran and Bougie, 2013). The most commonly used inter-project consistency reliability test is Cronbach's coefficient alpha. The higher the coefficient, the better the measuring instrument. If the reliability coefficient Cronbach's α is larger than 0.8, the reliability is very good, between 0.7 and 0.8, indicating that the reliability of the questionnaire is within the acceptable range. If the reliability coefficient is lower than 0.7, it means that some questions in the questionnaire need to be revised or deleted. For each variable item, CITC (total correlation after correction) and Cronbach 'α value after deletion are usually used to determine whether to delete the item. When CITC value is less than 0.4 or Cronbach 'α value after deletion is greater than Cronbach 'α value. Delete the item. When CITC value is less than 0.4 or Cronbach 'α value after deletion is greater than Cronbach 'α value of dimension, deletion of the item can be considered.

Table 7: The reliability tests for each item within the variables in the structure.
Reliability Analysis

Variable	Item	CITC	Cronbach's Alpha if Item Deleted	Cronbach's α
ET	ET1	0.789	0.768	
	ET2	0.648	0.809	
	ET3	0.703	0.795	0.842
	ET4	0.346	0.881	
	ET5	0.768	0.774	
PS	PS1	0.844	0.83	
	PS2	0.794	0.841	
	PS3	0.311	0.918	0.878
	PS4	0.718	0.852	
	PS5	0.777	0.841	
	PS6	0.728	0.85	
TC	TC1	0.441	0.844	
	TC2	0.681	0.797	
	TC3	0.683	0.796	0.837
	TC4	0.742	0.784	
	TC5	0.728	0.788	
	TC6	0.429	0.848	
TP	TP1	0.736	0.855	
	TP2	0.454	0.902	
	TP3	0.724	0.857	0.883
	TP4	0.77	0.850	
	TP5	0.774	0.849	
	TP6	0.738	0.855	

The reliability tests for the individual items within the variables in the constructs are shown in Table 7. Since the reliability coefficient for all the variables results were higher than 0.8, indicated a good internal consistency (Sekaran and Bougie, 2013).

Structural Equation Modelling (SEM)

CFA was conducted using AMOS to obtain additional information on the validity and reliability of the research tools used in the study. Each structure and its corresponding items are treated as distinct models with underlying variables and evaluated for fit. The main advantage of using SEM for CFA is that the effectiveness of the expected factor structure can be assessed by multiple goodness-of-fit metrics. Hari et al. (2010) proposed three or four indicators of model fitting and suggest being friendly to inclusive chi-squares. (X2/DF), approximate root-mean-square error (RMSEA), and either or both of the Goodness of Fit index (GFI), adjusted Goodness of Fit Index (AGFI), Normal Fit Index (NFI), and Turker-lewis Index (TLI). By convention, the relative chi-square is recommended to be less than 5.0, while GFI, AGFI, NFI, and TLI should be greater than 0.90. Similarly, RMSEA and RMR are considered a good fit when the indicator is less than 0.08 (Byner, 2010; Hair et al., 2010). Take it one step further. Hair et al.(2010) believes that if 3-4 of the above goodness-of-fit indicators are within the specified threshold range, the structural

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model can be fitted and further analysis can be conducted to test the constructed hypothesis.

Integrated Measurement Model

The internal consistency reliability, indicator reliability, convergent validity and discriminant validity of the integrated measurement model were evaluated based on each variable and dimension. The measurement model included four constructs as shown in Figure 5
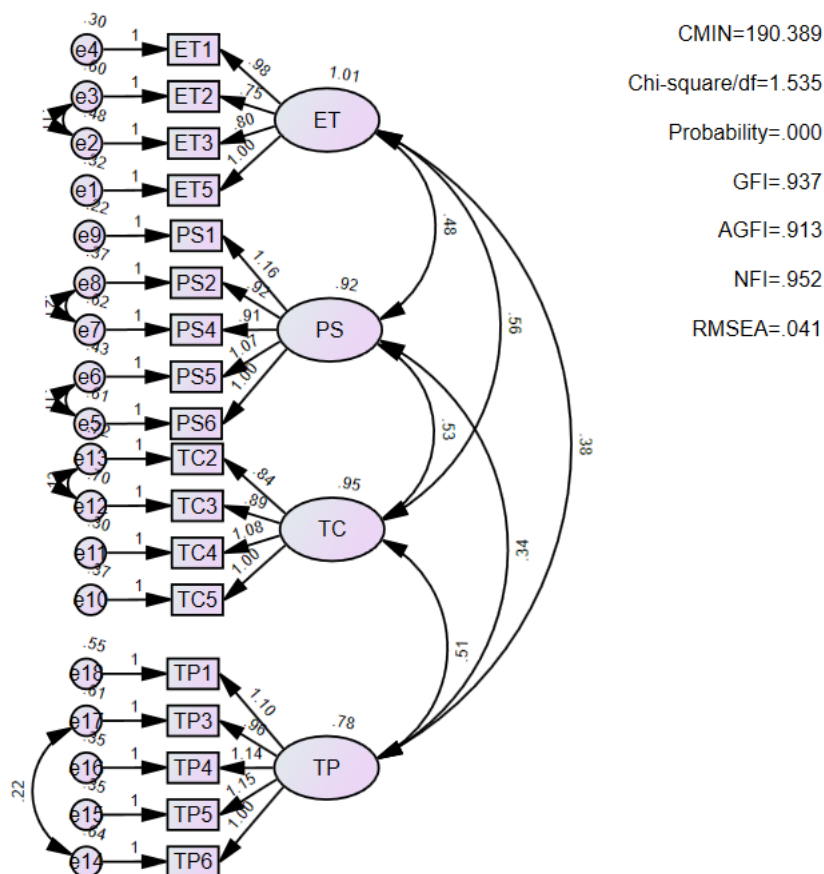

Figure 5: The integrated measurement model fit

The integrated model fit showed the measurement model with x^2(df-233)=190.389, p=0.000, x^2/df=1.535, GFI=0.937, AGFI=0.913, NFI=0.952, and RMSEA=0.041. It can be noted that all the obtained values are between the standard values, indicating a good measurement model fit of the construct.

The Overall Structural Model

Seven fit indices measures were used, Goodness-of-Fit Index includes CMIN/DF, RMR,GFI, CFI, RMSEA, CR, AVE. Based on these indices, some items were dropped/rejected and the model was re-evaluated using residual movement. This process was repeated until attaining accepted values for at least four of those indices. The development of the measurement model is discussed for each factor as described as follows: The measurement model's integrity of fit was measured with Chi-square/df <3, GFI > 0.9, AGFI>0.9, NFI>0.9, TLI>0.9, RMSEA<0.08 values (Hair et al., 2010). The overall structural model is shown in figure 6.

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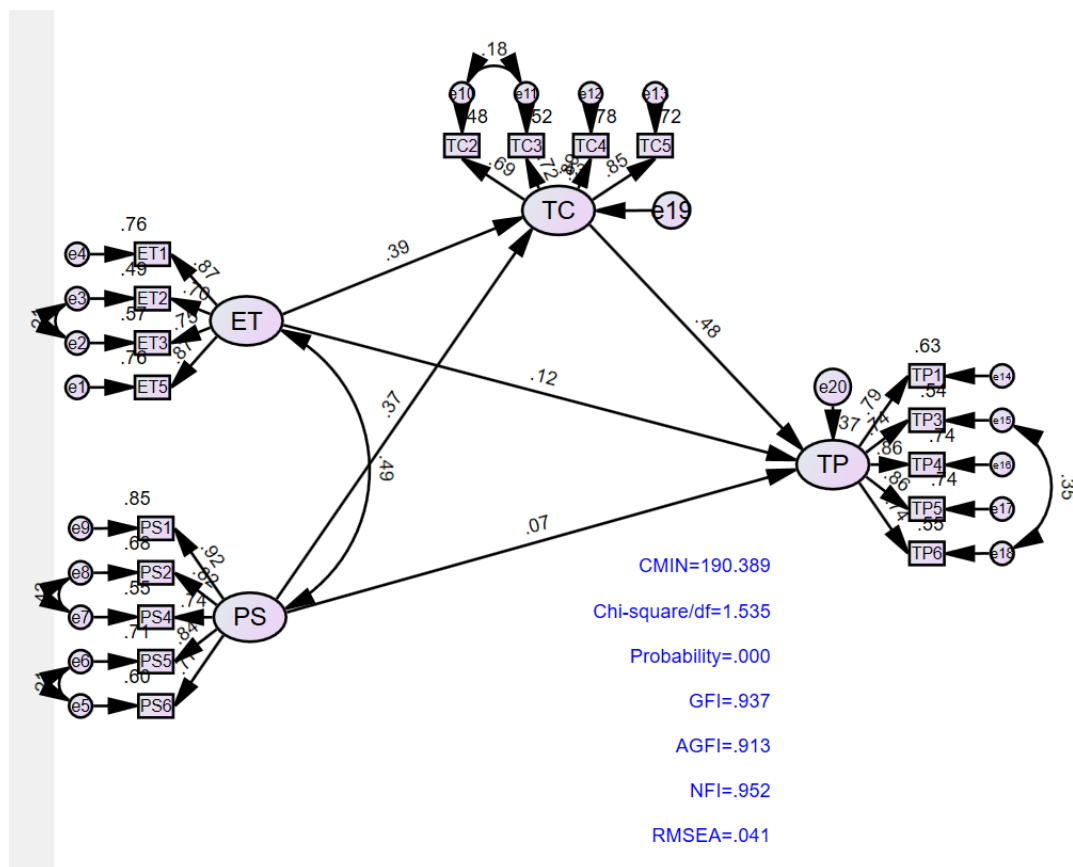
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Figure 6: Overall Structural Model

The measurement model was developed with the combination of 18 items related to the results of the final CFA (ET=4 items, PS=5 items, TC=4 items, TP=5 items) and is presented in Figure 4.15 with the correlated construct items. The results showed the measurement model fit of the research with x^2(df-233)=190.389; p=0.000; x^2/df=1.535; GFI=0.937; AGFI=0.913; NFI=0.954; and RMSEA=0.041. It can be seen that all these obtained values including x^2/df, GFI, AGFI, NFI, and RMSEA meet the standard values. Therefore, the results demonstrated that the structural model was fit with all the obtained values between the standard values, indicating a measurement model fit of the conceptual framework in this research. The structural model in this study fits the fitness index and can be used for further analysis.

Hypotheses Testing

Path analysis is the second main steps of SEM analysis to determine the fitting of measurement model. Structural models describe specific information about the association between independent and dependent variables (Hair et al., 2010, the evaluation of structural models emphasizes the overall model fitting, followed by the size, direction, and significance of the assumed parameter estimates. The purpose of the structural model is to draw conclusions from the sample and shows the relationship between variables.

Testing of Direct Relationships

The study has developed seven hypotheses based on previous research, including five of which are the direct relationships in the hypotheses. The hypotheses were tested according to the CR value of the standardized regression estimate, and the p-value. The regression weights and standardized regression weights (β) for the

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final structural model are presented in the Table 9. After the structural equation model was established, the estimated value of the detection path, standardized path coefficient, standard error S.E., T-value and significance P-value were obtained through the model fitting calculation of software. In general, if the T value is greater than 1.96, then the P value is less than 0.05, it can be considered that this path coefficient can pass the significance test within the 95% confidence interval, indicating that the corresponding path hypothesis of the preset model is valid. Otherwise, the hypothesis is not valid.

Table 9: Hypotheses Results of Direct Relationships Structural equation path test results

Hypothesis	Path	Estimate	β	S.E	CR	P	Result
H1	ET→TC	0.341	0.390	0.058	5.929	***	Supported
H2	PS→TC	0.291	0.373	0.050	5.82	***	Supported
H3	ET→TP	0.154	0.132	0.065	2.358	0.018	Supported
H4	PS→TP	0.171	0.163	0.057	3.024	0.002	Supported
H5	TC→TP	0.523	0.488	0.087	6.007	***	Supported

Mediating Relationships

The strength of the mediation effects, being determined by the strengths of the main effects, causes the power to detect the mediation effects to be lower than the power to detect main relationships (Awang, 2016). Further, Awang also noted that methods such as the percentile bootstrap and the bias-corrected bootstrap give the best combination of low Type 1 error rates and power to detect effects in mediation models (MacKinnon et al., 2002). AMOS software can test many mediation relationships simultaneously. However, Awang (2016) emphasizes that including several potential constructs in a model can lead to complexity. This research framework includes two independent variables, and the mediation study is conducted by constructing two simpler structural models, each of which has a mediator. In this study, bootstrap method was used for intermediate test. The bootstrap approximation was obtained by constructing a two-tailed bias-corrected confidence intervals based on 1000 bootstrapped samples that showed the size of the influence level and its level of significance (p value). According to Hayes (2013), bootstrapping is particularly useful for examining the sampling distribution. In this approach, the sample is treated as a "population library" from which a large number of random samples are extracted and continuously replaced, and the selection probability of any given case remains equal for each random extraction (Mallinckrodt, Abraham, Wei, & Russell, 2006).

Discussion

Education training programmes afford educators with valuable prospects to acquire and cultivate a diverse array of pedagogical competencies, encompassing instructional methodologies, classroom governance tactics, and evaluative approaches (Wang et al., 2023, Yuan & Ding, 2023). The acquisition and refinement of these particular skills significantly enhance their overall proficiency in effectively imparting instruction. Education training serves as a crucial mechanism for equipping teachers with a comprehensive understanding of the subject matter they are tasked with instructing (Tamsah et.al., 2023, Riordan, 2022). In addition, the

acquisition of a profound comprehension of the subject matter empowers educators to effectively explicate intricate concepts, address inquiries posed by students, and foster intellectually stimulating dialogues (Umar & Angga, 2023, Wang et al., 2023). Pedagogical knowledge encompasses the acquisition of diverse teaching methodologies, comprehensive understanding of learning theories, and adeptness in employing instructional approaches. The acquisition of this knowledge empowers educators to discern and select the most fitting pedagogical approaches tailored to various learning modalities, thereby facilitating the customization of instructional methods to effectively address the diverse needs of students (Sanganal, 2019).

Moreover the efficacy of educational training is underscored by its emphasis on a student-centered pedagogical approach, which prioritises the discernment and comprehension of the unique strengths, weaknesses, and interests of individual learners. The utilisation of this particular approach empowers educators to customise their pedagogical methods and assistance in accordance with the unique needs and characteristics of individual students, thereby fostering enhanced educational achievements (Wardana, Susanto & Nipriansyah, 2023). Reflective practise, an integral component of education training, serves to foster the cultivation of pedagogical expertise among teachers. This practise entails the conscientious examination and assessment of one's instructional approaches, as well as their consequential effects on the acquisition and development of knowledge and skills by students (Kirkpatrick et. al., 2023). By engaging in this reflective process, educators are able to discern the strengths and weaknesses inherent in their teaching methodologies, thereb The practise of engaging in regular reflection serves as a valuable tool for educators to discern and pinpoint specific areas within their instructional practise that warrant enhancement, thereby facilitating the implementation of requisite modifications.

In term of principal supervision, the praxis of principal supervision involves the provision of ongoing feedback and coaching by educational administrators. This particular mode of support enables the discernment of educators' proficiencies and domains necessitating enhancement (Niyamabha, Wichitpatcharaporn & Khamkhrueang, 2023). The bestowal of constructive feedback and guidance by educational principals functions as a catalyst for teachers to augment and hone their pedagogical acumen. Furthermore, the implementation of principal supervision fosters an elevated level of responsibility pertaining to the instructional efficacy exhibited by educators. The diligent surveillance and evaluation carried out by educational administrators ensures that educators are adhering to prescribed instructional standards and implementing pedagogical approaches that have been deemed effective (Li, Cai & Tang, 2023; Ko & Kim, 2023; Abu-Tineh, Romanowski & Alshaboul, 2023; Niyamabha, Wichitpatcharaporn & Khamkhrueang, 2023).

The domain of professional development is often shaped by educational training and the oversight of principals, thereby fostering numerous ongoing prospects for the refinement of one's professional expertise. These opportunities provide educators with the chance to familiarise themselves with innovative pedagogical methodologies, state-of-the-art educational technologies, and groundbreaking research findings, thus guaranteeing their up-to-date knowledge of the latest advancements in the field of education. The promotion of inter-teacher collaboration

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stands as a fundamental principle within the realm of education training and supervision, consequently nurturing the pedagogical framework commonly referred to as collaborative learning. The process of engaging in the exchange of experiences, best practises, and challenges among colleagues and school leaders serves to cultivate the growth of a supportive professional community, wherein educators are able to partake in reciprocal learning.

The motivation and engagement of individuals within the teaching profession are subject to notable influence from the provision of education training of exceptional quality and the implementation of meaningful supervision practises for teachers. The phenomenon of receiving support and empowerment from the educational community in which an individual is situated contributes to the enhancement of their commitment to their profession and their students (Sumaryanti & Purwanto, 2023). The facilitation of problem-solving skills among educators can be enhanced through the utilisation of principal supervision, a practise that involves the provision of guidance and support to teachers as they navigate the diverse challenges encountered within the classroom environment (Tamsah et. al.,2023). Through active participation in collaborative discourse and seeking guidance from educational leaders, teachers acquire the essential competencies to effectively navigate and overcome various challenges. The correlation between the improvement of educational achievements and the holistic advancement of educational institutions is inherently intertwined with the successful execution of educational training initiatives and the provision of proficient principal oversight (Li, Cai & Tang, 2023; Ko & Kim, 2023; Abu-Tineh, Romanowski & Alshaboul, 2023). The optimisation of student performance and the subsequent favourable influence on the standing and efficacy of educational establishments are reliant upon the existence of proficient and driven educators. The confluence of pedagogical instruction and administrative oversight fosters an ongoing iterative process of improvement for educational practitioners (Sumaryanti & Purwanto, 2023, Hallinger,2021). The provision of high-quality training serves as a means to equip educators with essential skills, thereby enhancing their professional capabilities. Simultaneously, the implementation of effective supervision mechanisms ensures the provision of continuous support and guidance throughout their professional journey. The ultimate result of this collaborative interaction leads to an enhanced level of pedagogical expertise, thereby providing benefits to both the knowledgeable instructors and the receptive students (Abu-Tineh, Romanowski & Alshaboul, 2023).

The augmentation of teacher performance is notably influenced by the heightened level mediation of teacher competency, which can be attributed to a multitude of interrelated factors. The efficacy of instruction is contingent upon the possession of a robust comprehension of both the subject matter and pedagogical strategies by educators exhibiting elevated levels of competence (Sitepu & Prasetia, 2023, March, Hallinger,2021). This facilitates educators in formulating and implementing meticulously organized instructional sessions that accommodate diverse modalities of learning, thereby leading to enhanced student understanding and involvement (Siah et.al., 2023). The implementation of differentiated instruction allows proficient educators to adapt their pedagogical approaches in order to effectively address the wide-ranging requirements of their student body. Educators possess the capacity to modify their pedagogical approaches, instructional resources, and evaluative

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measures in order to cater to diverse learning velocities, aptitudes, and inclinations (Syukri, Viona & Utama, 2023). Proficient educators possess the expertise to construct sound assessments that precisely gauge the extent of students' acquisition of knowledge. This practise facilitates the identification of areas in which students encounter difficulties, enabling instructors to adapt their pedagogical approaches accordingly. The attainment of high proficiency in classroom management enables educators to establish a conducive and well-organized milieu for the acquisition of knowledge (Ko & Kim, 2023; Abu-Tineh, Romanowski & Alshaboul, 2023). Consequently, this phenomenon serves to mitigate disturbances and optimise the duration dedicated to pedagogical activities. Educators who possess a high level of competence demonstrate a keen awareness and receptiveness to the feedback provided by their students, as well as the performance data that is made available to them (Patrick, Duggan & Dizney, 2023). Educators possess the ability to promptly discern instances wherein students encounter difficulties or exhibit disinterest, thereby enabling them to adapt their pedagogical methodologies accordingly in order to effectively tackle these challenges (Patrick, Duggan & Dizney, 2023, Tsang, Du & Teng, 2022).

Professionalism is a key attribute demonstrated by educators who possess a high level of competence. These individuals exemplify professionalism through their interactions with students, parents, and fellow colleagues. The individuals in question exemplify a robust work ethic, unwavering dedication to the achievement of students, and adherence to ethical principles (Ko & Kim, 2023; Abu-Tineh, Romanowski & Alshaboul, 2023). Proficient educators actively participate in the process of reflective practise, consistently evaluating their pedagogical approaches and actively pursuing avenues for enhancement. The unwavering commitment to personal growth engenders the development of increasingly efficacious pedagogical methodologies in due course (Oteng et al., 2023; Shengnan & Hallinger, 2021). The correlation between elevated levels of teacher competency and the implementation of stimulating pedagogical approaches is a well-established phenomenon that significantly impacts student motivation (Safrida et al., 2023). The implementation of captivating instructional sessions, well-defined educational targets, and fervent dissemination of knowledge serve as catalysts for motivating students to assume an active and participatory stance in their academic pursuits (Pang, Yuan & Li, 2023, Shengnan & Hallinger, 2021). The establishment of a conducive classroom culture is a paramount endeavour undertaken by proficient educators, wherein the principles of learning, collaboration, and courteous discourse are held in high regard. The aforementioned setting fosters an atmosphere that promotes active student engagement, idea exchange, and collaborative endeavours (Kronqvist Håård,2023). In general, the attainment of elevated levels of teacher competency yields a concomitant increase in the implementation of pedagogical approaches that are characterised by heightened levels of student engagement, efficacy, and a focus on student-centered learning. Consequently, this phenomenon engenders enhanced academic achievement among students, fostering a favourable educational milieu, and yielding superior results for both learners and educators alike (Patiño, Ramírez-Montoya, & Buenestado-Fernández, 2023, Hallinger,2021).

Conclusion

The study aimed to identify the influence of education training and principal's supervision on teacher performance through the mediating effect of teacher competency and whether the research objectives and questions can be verified. The

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empirical evidence found that education training and principal's supervision have a positive impact on teacher performance. Apart from these, teacher competency has been approved to be a mediating effects on the relationship between education training and teacher performance, between principal's supervision and teacher performance. It is found that education training has a significant impact on student performance, p value is 0.001 level, and has a significant positive impact on teacher performance. teacher competency has a significant mediating effect on the relationship between the independent variable and the dependent variable. Based on the current study, the researchers sought to identify correlations between the three main constructs in practice. In particular, it measures the mediating role of teacher competency among education training, principal's supervision, and teacher performance. So far, this study is one of the few in China to examine this relationship. Therefore, this study attempts to supplement the existing knowledge by testing and understanding the impact of these independent variables on teacher performance as the dependent variable, teacher competency as the intermediary variable, education training and principal's supervision as the independent variable.

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