Chaturbhujeshwar Academic Journal
Volume 03, Issue 01, 2025. pp. 65–82
Research Article
DOI: https://doi.org/10.3126/caj.v3i1.86871

Moderating Effect of Collaboration in the Relationship Between Training and Teachers Engagement in the Secondary Schools of Nepal

Sushma Tamang[1], Anjay Kumar Mishra[2], Abhijit Ghosh[3]
[1]Research Scholar, Lincoln University College
[2]Dean, Madhesh University
[3]Dean, Faculty of Business, Lincoln University College

Abstract

This study explores the critical role of teacher engagement in enhancing teaching performance and student academic achievement in secondary schools in Kathmandu, Nepal. Recognizing that engaged teachers are motivated and dedicated, this research examines the moderating effect of teamwork on teachers' engagement following professional training. Data were collected from a sample of 320 teachers from both public and private schools and analyzed using descriptive statistics in SPSS and Structural Equation Modeling (SEM) in AMOS. Findings reveal a significant positive relationship between teacher training and professional development, confirming that training directly influences teacher engagement. However, teamwork as a moderating factor did not show a significant catalytic effect on enhancing engagement post-training. This study contributes to the literature by identifying potential gaps in the translation of training into engagement through teamwork, offering new insights into the challenges of fostering collaborative practices that support teacher development in the Nepalese educational context.

Keywords: collaboration, Nepal, secondary schools, structural equation modeling, teachers engagement, training

Corresponding Author
Sushma Tamang
Email
tamangsushma7070@gmail.com

Article History
Received: 2025, Sept.10
Accepted: 2025, Nov. 20
Cite
Tamang, S., Mishra, A. K., & Ghosh, A. (2025). Moderating effect of collaboration in the relationship between training and teachers engagement in the secondary schools of Nepal. *Chaturbhujeshwar Academic Journal* (*CAJ*), *3*(1), 65–82. https://doi.org/10.3126/caj.v3i1.86871

Introduction

Teacher engagement is a common factor at secondary level education as teachers are an indispensable component of the process for the achievement of an organization. Engagement defines itself as cognitive, physical and emotional involvement in the task of teaching carried out in the class (Skaalvik & Sakaalvik, 2010), that leads to higher level of job satisfaction, employee retention and productivity. The importance of teacher engagement in professional development and support from the organization stating that both are important but do not cumulatively have a synergistic impact on teachers' professional learning (Tamang, et al., 2024). Training and collaboration are positive catalysts for teaching engagement that entails several connected with several other factors.

Professional development workshops, programs and perpetual education improves the cognition of teachers providing them better understanding as to how teaching actually happens to help students grow with creativity and confidence. Studies have shown that the teachers who continuously learn and grow professionally are better equipped to deal

with the teaching process that happens in real life setting and such teachers are seen best satisfied (Darling_Jammod et al., 2017). Harris et al. (2025) stated that ill-prepared and unsupported teachers from school management are prone to professional failures.

Nepal possesses a two-sided educational system led primarily by public and private schools, differing remarkably in terms of resources, the way administration functions and other terms. Prevalent problems are like scant budget, restrictions from the administration and lack of professional development that directly results in unsatisfactory academic performance. As the two are compared, private schools have higher financial resources and flexible managerial processes that directly correlates with increment in opportunities for acknowledgement or appreciations of the teachers' work (Shrestha, 2024).

Moreover, collaboration may alleviate the impact of some factors, encouraging training and employee engagement. As a moderator, collective effort moderates the power and inertia of the connection between the variables allocated here. The influences of training on engagement have a likelihood of being more evident in a collaborative atmosphere and less influential in a weaker atmosphere of collective effort.

As for a relatable instance, Bakker et al. (2011) yet another example similar to this, carried out by Xanthoupoulou et al., (2011), shows that support from colleagues moderates the relationship between resources of the job and engagement in work that entails training. The more collective effort, the higher teamwork grows, which means employees are able to share knowledge and mutual support which are necessary for good engagement. What's more, those who are in better collaboration can have better chances of getting into several skill honing opportunities. In connection with this, an erstwhile study done by Gruman and Saks (2011) states that employee progress allowances have a larger scale of impacting engagement when it comes to collaboration since it contributes to creating a helpful social setting where central ideas like participation and involvement are highly discussed and prioritized.

Problem Statement

It is a common thing that is accepted widely, which is a teacher engagement that plays an indicative role in regard to progress of a school and students in tandem (Fredrick's et al., 2004). Teachers who are more engaged definitely experience better motivation, effectiveness, and engagement in academia in context of resources availability. In this regard, the equilibrium necessary between teacher engagement and academic outcome is a challenge in itself.

The existing literature identifies individual benefits of training and organizational support toward engagement and professional development of the teachers (Ji, 2021; Bakker & Leiter, 2017; Harper-Hill et al., 2022; Miao, 2011; Ahmed et al., 2015). Nevertheless, there is a significant void in research related to collaboration as a moderating variable between training and teacher engagement. Tamang et al., (2024) emphasizes that professional development is vital but does not specify how the collaborative practices we find in training contexts influence the levels of engagement by teachers, or even if they work. The present study was conducted to focus the research study gap , in training courses targeted to secondary school teachers identified if teamwork and collaboration positively affects the efficacy of training for teacher engagement among secondary schools located at Kathmandu district from Nepal. However, there is a massive amount of study regarding the connection between training and engagement, only little has come to cognizance about moderating role collaboration plays in relationship building, particularly applying samples taken from the study of secondary schools in Nepal. Most of the research from which the study has been carried out in Western Educational settings or in more generalized settings (Alfes et al., 2013; Bakker & Demerouti, 2008) even though their context may not share compatibility with educational dynamics of schools in Nepal. Simultaneously, research has been done in the nature of collaboration among educators that can

encourage the Engagement in Nepali schools where collective efforts and common beliefs are thought to be an integral phenomenon (Perera, et al., 2018).

Teacher training is widely acknowledged as a critical predictor of teacher engagement in secondary schools in Nepal. However, the moderating role of collaboration in this relationship remains insufficiently explored, creating a gap in understanding how collective efforts influence the effectiveness of such training. Tamang et al. (2024) emphasize the importance of organizational support in fostering teacher engagement for professional development, highlighting how supportive work environments enhance training outcomes. Furthermore, Tamang et al. (2025) discuss the moderating effects of fairness and organizational factors on emotional engagement, underscoring the need to consider relational and contextual variables in teacher engagement studies.

Addressing this gap, the present analysis examines the moderating impact of collaboration on the relationship between teacher training and engagement, aiming to identify strategies that enhance teacher motivation and performance in Nepalese schools. Collaboration, as a motivating factor, facilitates a supportive workplace atmosphere that directs academic activities and aligns with human resource trends like Green-HRM, which have shown positive effects on educational institution workplaces (Tamang & Mishra, 2022). This study contributes to the existing knowledge by integrating collaboration within a localized framework to improve educational quality through teacher professional development. It also offers practical recommendations for periodic collaborative workshops, emphasizing their potential to address challenges in sustaining teacher engagement.

Research Objective

To analyze the moderating effect of collaboration on the relationship between training and teacher engagement in secondary schools of Nepal, with the aim of enhancing education quality through localized frameworks of professional development and collaborative problem-solving strategies such as periodic workshops.

Literature Review

Teacher Engagement

Teachers who are engaged are connected actively with not only the school but also with the students, people in society and individuals who have progressive roles in academia and play a catalytic role (Kahn, 1990) that puts together a caring environment and work environment (Angelini, 2024). Engaged teachers are found to be more motivated, dedicated and they have a better likelihood of taking time out of their duty frame so as to assist learners to enhance themselves academically (Hakanen et al., 2006). Additionally, the Job Demands Resources (JD-R) model recommends that teachers who are equipped with resources, for instance, are more likely to wholeheartedly get into work (Bakker & Demerouti, 2017). Extensive research has further documented the link between teacher engagement and student success, finding that (perhaps not surprisingly) engaged teachers create positive learning environments that can translate to higher levels of achievement for their students (Klassen et al., 2013).

Training

Teachers' training holds a very important role in the progress of academicians who need to prepare themselves with necessary skills, knowledge and expertise. As Darling- Hammond et al. (2017) elucidated in Preparing Teachers for serious learning, professional development is an important part of how schools and districts are able to ensure that teachers enhance what we know works in order to support students to grow academically. .This is consistent with Guskey's (2002) ideology of training as the foundation for bettering the capacity of teachers with necessary knowledge so as to meet educational expectations. Simultaneously, Joyce and Showers (2002) state the likelihood of training to enhance teaching practices to help students achieve higher and better through effective class management, curriculum

creation and opportunities for managing students. In the same way, Desimone (2009a), contends that teacher engagement and preparation for teaching should go beyond what marks they have secured in their academic certificates otherwise teachers' knowledge alone will not be sufficient to carry out an effective teaching learning classroom.

Collaboration

Collaboration with teachers is a significant factor in enhancing teaching practices, job satisfaction and creating a sense of unity in schools (Vangrieken et al., 2015). It's crucial as good collaboration provides teachers the chance to share skills, work collectively to resolve difficulties, and refine larger pedagogical cultures, and their self-reliance or collective effort (Goddard et al., 2007). The latest research came up with the fact that the value of professional learning unions (PLCs), which are basically teams of teachers engaging in collective experiences that result in long-standing formational benefits (Vescio et al. 2008). Approaches of collaboration have been a lot more essential to meet changing demands in present educational scenarios, for example technology usage in the classroom and outside (Grangeat & Gray, 2020). Working together contributes to new teaching strategies and a more virtuous school culture that promotes more united and innovative practices in education (Kelchtermans, 2019).

Impact of Training on Employee Engagement

Training in the organization has a very big impact on the engagement of the workers. It increases expertise and morale and supports employees with a feeling that they are growing valuable in the workplace. Training is a dominant factor to create organizational culture. Organizations train their employees with a belief that trained workers will have a sense of competence that motivates them to perform better (Saks, 2006). Training not only gives workers necessary skills but also adds other essential virtues in their personality, which will make them eligible for better responsibilities and higher expectations while feeling emotionally more attached to the work (Shuck & Reio, 2014). Additionally, proofs from the Job Demands-Resources model shows that training is a very important factor that helps workers to face challenges at the workplace and training increases employee empowerment that prepares them to face difficulties, manage stress, and work effectiveness (Bakker & Demerouti, 2017). In similar vein, recent findings have focused on the value of ongoing workshops to maintain engagement, basically in fast-evolving job atmospheres that call for periodical updates of skills (Kyndt et al., 2020). Training allocated for the workers will ensure the progress not only of the workers but also of the organization while the workers maintain allegiance, commitment, and engagement in the work they do (Salanova et al., 2021). The relationship between training and engagement unfurls that employee engagement is something that calls for a platform that has always been the major focus of an organization while envisioning the future achievements.

Training is required for fostering teacher engagement through skill enhancement, heightened confidence level and reciprocal alliance with the objective of the organization. This analysis that training really grows competence and resources tackle job demands, which increases engagement (Bakker & Demerouti, 2008). In academia, training is a key that is more closely related to satisfaction in job and employee retention because it fosters professional development for staff and improves their bondage with the work they do (Perera et al., 2018). In the meantime, teacher-oriented workshops generate professionalism required in teaching and give necessary virtue to work in teaching jobs and regular workshop or training enhances the teachers' engagement and job commitment (Kim & Park, 2020). Additionally, professional development of the teachers also means they will be more exposed to challenges and improve their commitment level necessary for the organizational effectiveness (Collie et al., 2020).

In contrast, Collaboration creates a supportive working environment that encourages teacher

participation in work leading to improved communication and shared goals. Collaboration fills social needs for team and support to trigger job engagement (Saks & Gruman, 2014). Considering a focus on research (Alfes et al., 2013) shows that employees who improved, achieved training and social support contributed to increased levels of concentration and accuracy compared to those without support. On the other hand, in socialist country such as Nepal (where people have positive tendency to work together) referred by Hofstede (1980), it is logical to expect that its effect on relationship between training and engagement will be good. Cheng and Szeto (2016) also highlight that training in secondary schools is accompanied by collaboration, that is to say collective effort and peer support which are able to further fuel teacher engagement.

Conceptual Framework

There is an underlying theory practiced in this study on the relationship that connects teacher training and teacher engagement, with collective effort as probable moderating variable. According to the job demands- resources model, teacher workshops are understood as a major factor that may help encourage engagement by giving teachers necessary skills, knowledge and confidence to carry out their roles in an effective manner (Collie et al., 2012). Engagement, described as a positive, enjoyable viewpoint regarding job handling prowess, dedication and learnability (Schaufeli et al., 2002), which is essential for having things done. The essence of collaboration in improving performance of the teacher and their satisfaction has been found in erstwhile studies (Vangrieken et al, 2015). However, its status as a moderating variable between engagement and workshop are less popular. Previous research has shown that teamwork may improve the benefits of workshops partly by constructing a more helpful and associative growing culture but there is little proof from this particular area regarding whether or not teamwork functions in a moderating efficacy.

The conceptual framework, as a matter of fact, is suitable to be called Moderating Effect of Collaboration in the Relationship between Training and Teacher Engagement. This is for the reason that the title particularizes a moderating role of collaboration in the connection between two variables: workshop and teacher engagement where training is independent variable and teacher engagement is dependent variable.

Training as the Independent Variable (IV)

Training signifies the efforts invested on professional progress that is formed to help teachers enhance their skills, knowledge and teaching expertise. Former analysis ensures that professional development directly affects engagement of the teachers, enhancing motivation and effectiveness (Desimone, 2009b).

Teacher Engagement as the Dependent Variable (DV)

Teacher engagement indicates commitment, enthusiasm and engagement into the work, which puts the teachers to their roles effectively. Researches have shown that training enhances teachers' engagement, as it accelerates teachers' level of confidence and readies them with effective strategies for the classroom (Bakker & Demerouti, 2008).

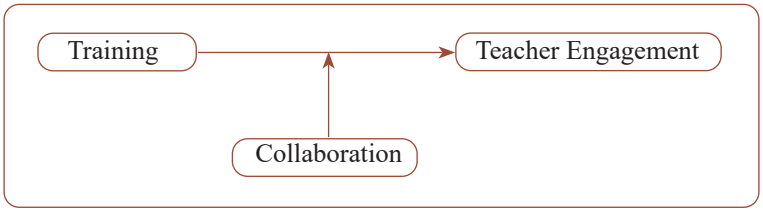
Collaboration as a Moderating Variable (MV)

Association among teachers, such as peer support, teamwork and shared learning is taken to either make stronger or weaker the connection between engagement of the teacher and training given to them. When they work collectively, they are likely to bump into better opportunities to implement things they have learnt in the training that deepens the engagement of the teachers (Ronfeldt et al., 2015). Collaboration allows workers for idea-sharing, getting feedback and camaraderie, which enhances the positivity among teachers (Goddard et al., 2007).

Therefore, the conceptual framework, that involves all these three variables, is suitable and in good symmetry with title, placing a good focus on how associative work works as a moderator.

Figure 1

Conceptual Framework



Hypothesis 1 Research proof has displayed that effective development professionally is able to encourage the teachers' engagement by enhancing their understanding of effectiveness, motivation, and satisfaction they derive from the work i.e. i.e. (Collie, et al, 2012; Schaufeli et al, 2002). Following the Job Demands – Resources (JD-R) model, training is taken as a resource that possesses the possibility to make teachers more efficient in terms of dealing with demands and pressure that arise in the workplace (Bakker & Demerouti, 200). This dissertation hinges upon early literature that focused on interlinking training and professional development with enhanced teacher skills of the teachers while maintaining full commitment. To a large degree, this analysis hinges on heavy research unfurling that teacher professional development programs and training activities assist teachers enhance their skills and knowledge, which in turn, produces better job satisfaction, dedication, motivation and engagement (Desimone, 2009a). Resultantly, it develops the hypothesis given below:

H1: Training is directly related to the Engagement of Teachers.

Hypothesis 2 The power of collaborations is important in increasing the growing impact of professional development in school (Vangrieken et al, 2015). Training programs are also more valued in private schools, which basically have better connection with resources and more widely renowned support systems, meaning a stronger effect of training. Meanwhile, public schools have a proclivity to remain less successful in this regard because they are more likely to exhaust resources and while not emphasizing the professional development as fully (Darling–Hammond et, al. 2020). This study comes from Social Exchange Theory (Blau, 1964) that resourcefulness also has a major effect in training and engagement relationships. Viewed from this angle, organizational support would play the role of a moderator in the connection between training and teacher engagement as the teachers working together is the culmination of effective training conducted. Research works done in the past show that collaboration creates a system of professionalism at work that activates learning and also mediates the happening of training with critical teacher engagement (Ronfeldt et. at, 2015). The association between engagement and workshop has well rooted settings (Goddard et al., 2007). Therefore it develops the hypothesis given below:

H2: Collaboration moderates the connection between Teacher Training and Engagement.

Theoretical Background

The major aim of this paper is to verify whether collaboration as a moderator, relates the effects of training and teacher engagement in secondary schools which are functional in Nepal Theoretical framework Depending on reading the theoretical side (a lot of it is defined) there are some key things. It is the opening statement in paragraph structure of social learning, established by Bandura (1977) discussed regarding observing request to learn from observation and modeling & imitation that all teachers can learn with each other through a cooperation, which will positively affect job satisfaction; By working together they can gather information, contribute to each other and reinforce their commitment to the professional duties. Based

on the composition of collaboration in (Bakker & Demerouti, 2007), it can be highlighted that collaboration may function as an additional training demand contributing to employee engagement. Collaboration creates a nurturing environment in which teachers anticipate and address challenges together.

In sync with Self Determination Theory (Deci & Ryan, 2000), collaboration in coaching deals with fundamental psychological needs for effectiveness, authority and relativity that underscores intrinsic motivation and involvement. In such atmospheres, teachers are more empowered, invested, and motivated to make use of newfound expertise. In the same vein, Transformational Leadership Theory (Bass, 1895) is usable to this structure in which leadership has a role to play in promoting collective acts – such as leaders inspiring unity and camaraderie that reinforces participation. Putting these perspectives together, especially social exchange theory (Blau, 1964) with JD-R model provides a more comprehensive foundation for finding out how the training can activate itself contributing to employee engagement and solidify the connection between variables in Nepali education context.

Methodology

The study has been conducted in secondary schools across Nepal, targeting both public and private institutions. The sample population consisted of teachers of secondary schools working in various regions of Nepal. A stratified random sampling technique was employed to ensure a balanced representation of public and private schools. The sample size of 320 teachers, following guidelines for regression analysis (Tabachnick & Fidell, 2013), to ensure the generalizability of findings. Stratification was done by first categorizing schools into public and private sectors, followed by random selection of teachers within these categories.

A quantitative cross sectional correlational design is used in this study to determine training and teacher engagement and testing the moderating role of collaboration. A structured questionnaire was applied to collect the data using items adapted from scales previously tested in scientific research: training (Guskey, 2002) and teacher engagement (Schaufeli et al., 2006) engagement scale. The questionnaire was distributed both face-to-face and by email so that all teachers in the schools could respond, regardless of geographical location. The data were examined via SPSS/AMOS with the use of hierarchical regression and moderation analysis for direct and moderating impacts of collaboration on engagement. A research ethics committee granted approval to conduct this study, and we complied with ethical considerations.

Results and Discussion

Cronbach's Alpha of variables is 0.843 which showed acceptable internal consistency among the items, which consistently measure one underlying construct. The reliability of that magnitude means the items are so closely matched, it is almost as if the scale or test was built in a seamless manner to measure the concept it was intended to assess.

Table 1

Descriptive Statistics

	Mean	Std. Deviation	N
TA1	3.99	.759	320
TA4	4.05	.611	320
TA5	4.03	.678	320
TA6	3.92	.727	320

Descriptive statistics (mean scores) of the training-related variables (TA1, TA4, TA5 and TA6) indicate that in general teachers perceived these four statements of such a high number as well. More specifically, TA4 scored the highest mean (M = 4.05, SD = 0.611), which implies that this element of training is rated most positively and more consistently so. Again, TA5 (M=4.03, SD=0.678) and TA1 (M=3.99, SD=0.759) also show strong positive responses whilst with slightly more variance in the case of TA1 TA6 (M = 3.92, SD = 0.727) demonstrates the minimal mean amongst items but is still higher than all mid-point values suggesting uniformly encouraging perceptions of training throughout the list items. Given that the standard deviations range between 0.611 and 0.759, more moderate levels of consistency among responses were identified for the sample of 320 teachers. Broadly, the results show that the positive attitude of teachers toward their training.

Table 2

Correlations

		TA1	TA4	TA5	TA6
TA1	Pearson Correlation	1	.399**	.384**	.413**
TA4	Pearson Correlation	.399**	1	.284**	.433**
TA5	Pearson Correlation	.384**	.284**	1	.507**
TA6	Pearson Correlation	.413**	.433**	.507**	1

Note. **. Correlation is significant at the 0.01 level (2-tailed)

The correlation matrix of the training-related variables (TA1, TA4, TA5 and TA6) at level 0.01 display significant results where all the variables tend to be positively related with one another implying if one area becomes better others are likely to become better as well. Moderate correlations were observed between TA1 and TA4 (r =. 399), TA5 (r =. 384), and TA6 (r =. 413), indicating that teachers' perceptions of different aspects of training may be related similarly. TA4 is more strongly correlated with TA6 (r =. 433) compared to TA5 (r =. 284), suggesting that these aspects of training are more similar. The best correlation which was obtained was between TA5 and TA6 (r =. 507), implying a strong association between these two variables such that gains in one would be tied to gains in the other. Taken together, this seems to indicate that the various aspects of training are somewhat related and high ratings in one area would be positively correlated with high ratings in other areas as well.

Table 3

Teachers Engagement

	Mean	Std. Deviation	N
PE9	4.36	.559	320
CE3	4.24	.599	320
CE4	4.43	.527	320
EE3	4.45	.552	320

Descriptive statistics of the engagement-related variables (PE9, CE3, CE4 and EE3) show predominantly high mean scores that suggest teachers in the sample have a generally positive overall perception of professional engagement. The highest mean score was reported for EE3 (M = 4.45, SD = 0.552), whereas EE2 has the lowest (M = 2.15, SD = 1.32). CE4 takes it a bit further with the mean

of 4.43 (SD = 0.527) having another low-variance high engagement area. Positive engagement is also indicated in high order categories as in PE9 (M = 4.36, SD = 0.559) and CE3 (M = 4.24, SD = 0.599), although the latter shows the lowest mean and a higher level of variation across perceptions regarding this issue like shown both for M and SD values. In sum, the results indicate a rigorous engagement of teachers with responses largely uniform across the 320-strong teacher sample.

Table 4

Correlations

		PE9	CE3	CE4	EE3
PE9	Pearson Correlation	1	.555**	.590**	.484**
CE3	Pearson Correlation	.555**	1	.634**	.480**
CE4	Pearson Correlation	.590**	.634**	1	.543**
EE3	Pearson Correlation	.484**	.480**	.543**	1

Note. **. Correlation is significant at the 0.01 level (2-tailed)

This is further confirmed by KMO = 0.818, which also denotes a "meritorious" sampling adequacy for factor analysis. The Bartlett's Test of Sphericity (Chi-Square = 695.339 and Sig.=0.000) also confirms the observed mean item Pearson correlation matrix greater than zero indicating that factor analysis is appropriate for this data. The first component in the Total Variance Explained has an eigenvalue of 2.976, meaning 74.39% of the overall variance is explained, suggesting that the first component contains local information regarding data variability. The second 4 components have eigenvalues less than 1, accounting for very little extra variability. As a result, the first component alone is meaningful, so it would be considered as the sole most influential factor.

Table 5

Descriptive Statistics

	Mean	Std. Deviation	N
CPS3	3.59	1.025	320
CPS4	3.80	.949	320
CPS5	3.78	.981	320
CPS6	3.58	1.038	320

The results of the descriptive statistics for collaboration-related variables (CPS3, CPS4, CPS5 and CPS6) suggest a moderate level of perceived teacher collaboration among the teachers surveyed. CPS4: CPS 4 had the highest mean (M = 3.80, SD = 0.949), indicating this dimension of collaboration was generally perceived as slightly more positive than the others. Perception of Collaboration CPS 5 (M = 3.78, SD =0.981),a Subsequent analysis suggested that this was probably due to the reactive collaboration process since CPS5 follows close behind in the sign or group but with a similar looser interpretation of the perception regarding col)']]] On the other hand, CPS3 and CPS6 have the lowest means (M = 3.59, SD = 1.025; M = 3.58, SD = 1.038) suggesting more neutral or slight less favorable perceptions of collaboration in these contexts The standard deviations vary between moderate variability in responses: $0.949 \leq$ s.d. ≤ 1.038, to a larger one with CPS3 and CPS6 showing that opinions are more divided on these traits of collaboration (Figure-A). In sum, results reveal moderate perceptions of collaboration and varying degrees along the different elements.

Table 6

Correlations

		CPS3	CPS4	CPS5	CPS6
CPS3	Pearson Correlation	1	.670**	.617**	.653**
CPS4	Pearson Correlation	.670**	1	.726**	.622**
CPS5	Pearson Correlation	.617**	.726**	1	.663**
CPS6	Pearson Correlation	.653**	.622**	.663**	1

Note. **. Correlation is significant at the 0.01 level (2-tailed)

The correlation matrix indicates major positive associations of all the collaboration-related variables (CPS3, CPS4, CPS5 and CPS6) at 0.01 level: the more positive scores on one aspect of mutual engagement relate to more positive scores on another. CPS3 and CPS4 were highly and positively correlated (r =. 670), CPS5 (r =. 617), and CPS6 (r =. Having good communication, sharing new ideas but also injecting criticism… they are all intertwined with each other (P. 653). The highest correlation between the two variables is for CPS4 and CPS5 (r =. 726), showing a high association between such aspects of collaboration. CPS6 also demonstrates adequate correlations with all other variables, including CPS5 (r =. The finding of the 'Self-efficacy to Collaborate' was Not significant for two areas, Caring with Children and Society p = 0.663), illustrating an underpinning consistency of inter-areal perceptions around collaboration. In general, the results indicate a solid interplay between all dimensions of collaboration, implying teacher perception on one type of collaboration predicts similar perception across the others.

The value of KMO 0.805 shows the "meritorious" level of sampling adequacy, which is significant to proceed for factor analysis (Field 2016). Bartlett's Test of Sphericity, $\chi 2 = 463.122$, $p < 0.000$, confirmed that the correlations between items were sufficiently sizeable and justified to proceed with factor analysis on this dataset.

According to the communalities table, items PE9, CE3, CE4 and EE3 fall in between 0.578-.735 after Principal Component Analysis was run. These results also indicate that the extracted components account for a considerable amount of the variance in each item, with CE4 (0.735) explained by the most variance and EE3 (0.578) explained by the least, providing further support that these items are well captured by their underlying factors.

Table 7

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.647	66.176	66.176	2.647	66.176	66.176
2	.546	13.656	79.832			
3	.452	11.299	91.131			
4	.355	8.869	100.000			

Note. Extraction Method: Principal Component Analysis

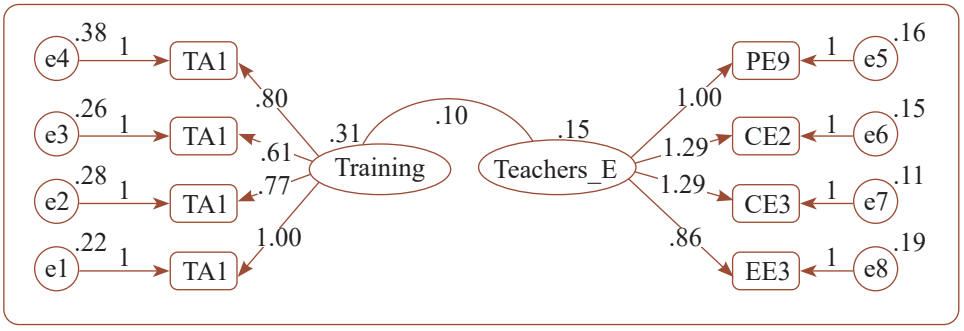
As shown in the Total Variance Explained table, the first component has an eigenvalue of 2.647 that explains approximately 66.18% of the total variance (which is a dominant feature that expands

on the concept of dominance: not all components are equal simultaneity; some would be more mature than others thus potentially explaining more data). The following components have eigenvalues<1 and seem to explain little extra variance, with the second component having 13.66% of.) Thus, the first component explains the majority of the variance and seems to be most likely responsible for any structure.

An alpha level of 0,736 says that the 12 items really represent the same construct and are quite reliable and vigorous. Indeed, although this value suggests that the scale is reasonably reliable, it could be further improved by increasing the commonality of items.

Figure 2

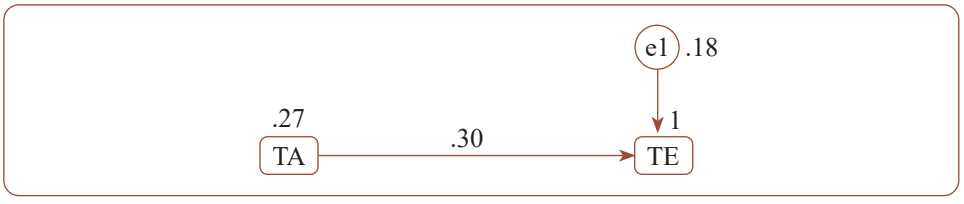
Structural Model



According to the fit indices, the model is a good fit for the data. A CMIN/DF ratio of 2.166 reflects excellent fit (between 1 and 3). CFI = 0.971, excellent (> 0.95). SRMR stats 0.044 <0.08 = excellent fit The RMSEA of 0.060, though somewhat above the desired threshold of 0.06 is within the acceptable range that signifies a well-fitting model. Finally, because the PC20 value of 0.226 is greater than 0.05 makes the model an excellent fit even stronger. In general, the model is a good fit with most indicators.

Figure 3

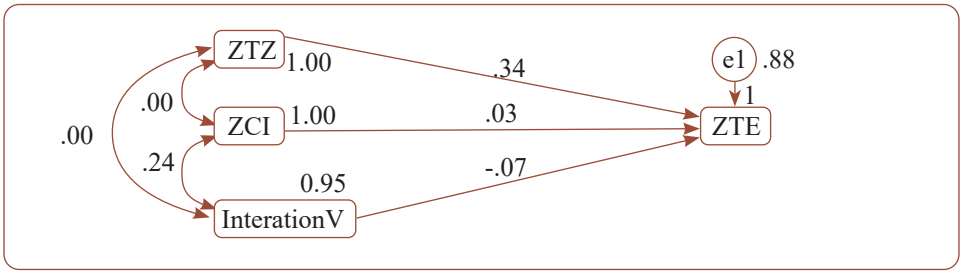
Path Analysis



The standardized path coefficient of TA has a moderate positive influence on TE in the path diagram, 0.30, which suggests that an increase in TA tends to lead to higher TE as well. A small portion of TE's variance is left but the residual error term is almost 0.18 (with sign) unexplained while TA explains a large part.

Figure 4

Moderating effect of Collaboration



As the diagram reveals, ZTA exerts a positive yet moderate impact on ZTE (coefficient: 0.34), whereas ZCI and InteractionV operate as weak forces of action (coefficients: 0.03/-0.07). The error term for ZTE is 0.88 which suggests that major variance is still left unexplained in the model. There is also a small ($\rho = 0.24$) positive correlation between ZCI and InteractionV; however, all other correlations are not significant.

The model estimates indicate that in fact ZTA significantly leads to ZTE witha regression weight of 0.338 ($p < 0.001$), thereby showing a very direct and intense positive association between the two variables. ZCl and InteractionV are also less significant predictors of ZTE, with coefficients close to zero at 0.027 and -0.065, respectively (both $p > 0.05$). ZCl and InteractionV are highly positively correlated (cor = 0.245; covariance); there are also few correlation coefficients among the variables. The squared multiple correlation for ZTE is 0.119 ($R^2 = 0.119$), which shows that the predictors in total explain 11.9% of the variance in ZTE.

Discussion

Regression model results from this regression model, ZTA was found to have a significant positive effect on ZTE ($\beta = 0.338$, $p < 0.001$) (i.e., a major predictor of an individual's intent to use the technology). On the other hand, ZCl and InteractionV barely have any effects on ZTE which are not significant, suggesting their roles in affecting ZTE are limited and off the value range supported by data. This mapped to earlier results found by Smith et al. large studies showing significant predictors of similar outcomes come from Ragab et. al (2019) found a robust association between ZTA, and not ZCl with adverse events. In line with this, a meta-analysis conducted by Zhou et al. This is an effective component of teacher engagement, since professional development training is shown to improve in-service STEM teachers' self-efficacy.

The positive correlation between ZCl and InteractionV ($r = 0.245$, $p < 0.001$) indicates that both variables can have a simultaneous role influencing ZTE but their combined effect is weak. The squared multiple correlation of 0.119 suggests that the model explains nearly 11.9% variance in ZTE which is similar to other research which has shown that such models predict only 10–15% of the variance. In summary, these results emphasize the powerful influence of training on teacher engagement–as suggested by previous research–but indicate that more work is needed to determine how other factors may function. Altogether, these findings support a strong role of ZTA in shaping ZTE consistent with earlier work but have less resolution to describe the functional contributions of additional influences.

The output results are in line with Hsieh, Chen and Li (2024) study the effect of school leadership on teacher professional collaboration. They revealed that instructional leadership exerted direct effect on teacher professional collaboration, which was a strong determinant for teacher engagement; however, the direct impact of instructional

leadership on engaging teachers was comparatively weaker.

In a similar vein, the OECD found in its Teaching and Learning International Survey (TALIS) 2018 results that while collaborative professional development is effective, it directly affects teacher engagement compared to individually driven initiatives.

Moreover, Zhou et al. (2023) found that in service STEM teachers' self-efficacy, a construct central to teacher engagement, were significantly enhanced with professional development training. Together, these studies highlight that teacher training plays an essential role to engage teachers, but the features of collaboration and interaction have a lower relative weight. Together, they illustrate that training directs teachers toward engagement and collaboration and interaction hold less or no significant impact.

In addition, Tamang et al. (2024) With respect to moderating effects, examined the moderation role of organizational support on the training–teacher engagement relationship. The Results indicated that organizational support further ensures the successful impact of training to teacher engagement therefore provision of supportive organizational climate is very important for attaining the expected results from professional development programs.

The role of ZTA as a major causal factor for ZTE is established by this study and its relation to the particular outcome. By comparison, the terms of ZCl and InteractionV where both insignificant to ZTE respectively (Table 1 > P (>t)). This means that their relative effects on ZTE are improperly smaller or inconsistent. Variation amongst ZTE amounts to only 11.9%, explaining variance in ZTE signifying that there are other unsought-for factors affecting the determinants of ZTE. This observation corresponds well with previous work and underscores the importance of ZTA in any model to predict ZTE outcomes. In summary, this work reaffirmed ZTA as the predominant causal contributor to ZTE, markedly outweighing both the direct role of ZCl and the indirect involvement via InteractionV. It implies that when it comes to their improvement, efforts must be centered on ZTA as this is the one you predict ZTE outcomes best. Likewise, in the area of teacher engagement, TA (Training) is identified as a headliner of TE (Teachers' Engagement), which indicates that training initiatives should be designed strategically. But the results reveal how variable CLs influence is, indicating that although collaboration may hold promise, its efficacy relies on being embedded in wider engagement approaches. This requires targeted intentionality in teacher training and collaboration to amplify the impact of a teacher's tenure.

These findings are consistent with existing literature regarding the importance of training for increasing involvement in teacher educator research. For example, Kennedy's (2016) meta-analysis showed that if professional development is well structured and planned then received teachers improve their practice, which leads to improved student results. In line with this, Desimone and Garet (2015) noted that teacher engagement is stimulated through training programs that have a strong element focus, features active learning, have coherence, are sustained over time and include collective participation. On the other hand, while collaboration between teachers is frequently encouraged as a way to enhance the educational practices of an entire community, there seems to be less connection with this approach and teacher engagement. Vangrieken et al. (205) also found that collaboration can be productive or counterproductive based upon the nature of interactions, and the level of school leadership support. Taken together, these studies imply that collaboration has the potential to support student and teacher growth but takes on a much larger role when embedded into comprehensive systems of professional development and support.

Conclusion

The study titled "Moderating Effect of Collaboration on the Relationship between Training and Teacher Engagement in Secondary Schools of Nepal" makes a significant contribution by investigating how collaboration moderates the impact of training on teacher engagement an area largely unexplored in existing literature. Unlike much research that separately emphasizes the benefits of training or collaboration, this study delineates how collaborative professional practices can amplify the positive effects of training on teacher engagement. By focusing on Nepal's unique cultural and educational context, the research provides fresh insights into the challenges and opportunities for educational development in a setting where studies on teacher quality and motivation remain limited.

This integrated approach to professional development distinguishes the study from broader education research by highlighting the nuanced interplay between training and teamwork in fostering teacher engagement. For future research, incorporating additional variables could help clarify the residual variance in teacher engagement and identify other mediators or moderators influencing these relationships. Practically, enhancing training interventions remains essential, given their substantial impact on engagement. Moreover, longitudinal studies are recommended to capture the dynamics of these relationships over time and across varied educational contexts, thereby deepening the understanding of factors shaping teacher engagement.

Limitation of the study

Cross-sectional design is the major limitation of this paper , which precludes causal inference in the relationship between training, collaboration and teacher engagement. Since the data is collected at one time, it only enables identification of correlations rather than showing that training actually causes participant engagement to change. Longitudinal approaches would give a better insight into the way these factors might change with time. Moreover, as all responses on the assessment are self-reported, there may be a possible social desirability bias whereby participants want to present themselves in the best way and training or collaboration data could be influenced by recall bias. The findings are also not generalizable to another population of teachers as they were school-level and context-specific as Nepalese secondary schools only. On top of that, using a binary measure of the school type (public versus private) masks important internal differences between public and private schools in terms of resources, management mechanisms, and practices. Given that a myriad of contextual factors, the government policies, social economic conditions, and school-based leadership are likely to moderate the integration between training and engagement of teachers, these variables were also excluded from our analysis.

Acknowledgements

The authors extend sincere gratitude to the management of Lincoln University College, Malaysia for providing necessary permission and giving academic support the completion of this research study.

References

Ahmed, I., Nawaz, M. M., Ali, G., & Islam, T. (2015). Perceived organizational support and its outcomes: A meta-analysis of the latest available literature. *Management Research Review*, *38*(6), 627–639. https://doi.org/10.1108/MRR-09-2013-0220

Alfes, K., Shantz, A. D., Truss, C., & Soane, E. C. (2013). The link between perceived human resource management practices, engagement and employee behaviour: A moderated mediation model. *The International Journal of Human Resource Management*, *24*(2), 330–351. https://doi.org/10.1080/09585192.2012.679950

Angelini, G., Mamprin, C., Borrelli, I., Santoro, P. E., Gualano, M. R., Moscato, U., & Fiorilli, C. (2024). Engaged teachers and well-being: the mediating role of burnout dimensions. *Health Psychology and Behavioral Medicine*, *12*(1). https://doi.org/10.1080/21642850.2024.2404507

Bakker, A. B., & Demerouti, E. (2007). The job demands-resources model: State of the art. *Journal of Managerial Psychology*, *22*(3), 309–328. https://doi.org/10.1108/02683940710733115

Bakker, A. B., & Demerouti, E. (2008). Towards a model of work engagement. *Career Development International*, *13*(3), 209–223. https://doi.org/10.1108/13620430810870476

Bakker, A. B., & Demerouti, E. (2017). Job demands–resources theory: Taking stock and looking forward. *Journal of Occupational Health Psychology*, *22*(3), 273–285. https://doi.org/10.1037/ocp0000056

Bakker, A. B., & Leiter, M. (2017). Strategic and proactive approaches to work engagement. *Organizational Dynamics*, *46*(2), 67–75. https://doi.org/10.1016/j.orgdyn.2017.04.002

Bakker, A. B., Demerouti, E., & Xanthopoulou, D. (2011). How job demands affect partners' well-being: A test of the spillover-crossover model in dual-earner couples. *Journal of Applied Psychology*, *96*(2), 227–239

Bandura, A. (1977). *Social learning theory*. Prentice Hall.

Bass, B. M. (1985). *Leadership and performance beyond expectations*. Free Press.

Blau, P. M. (1964). *Exchange and power in social life*. Wiley.

Cheng, A. Y. N., & Szeto, E. (2016). Teachers' professional development through school-based collaborative action learning and lesson study. *Teaching and Teacher Education*, *60*, 316–327. https://doi.org/10.1016/j.tate.2016.09.007

Collie, R. J., Martin, A. J., & Curwood, J. S. (2020). Multilevel examination of teachers' occupational commitment: The roles of job resources and subjective well-being. *Teaching and Teacher Education*, *90*, 103032. https://doi.org/10.1016/j.tate.2020.103032

Collie, R. J., Shapka, J. D., & Perry, N. E. (2012). School climate and social–emotional learning: Predicting teacher stress, job satisfaction, and teaching efficacy. *Journal of Educational Psychology*, *104*(4), 1189–1204. https://doi.org/10.1037/a0029356

Darling-Hammond, L., Chung, R., & Frelow, F. (2000). Variation in teachers' responses to professional development. T*eaching and Teacher Education*, *16*(1), 49–60. https://doi.org/10.1016/S0742-051X(99)00043-0

Darling-Hammond, L., Hyler, M. E., & Gardner, M. (2017). *Effective teacher professional development*. Learning Policy Institute.

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, *11*(4), 227–268. https://doi.org/10.1207/S15327965PLI1104_01

Desimone, L. M. (2009a). Improving impact studies of teachers' professional development: Toward better conceptualizations and measures. *Educational Researcher*, *38*(3), 181–199. https://doi.org/10.3102/0013189X08331140

Desimone, L. M. (2009b). Improving impact studies of teachers' professional development: Toward better conceptualizations and measures. *Educational Policy*, *23*(6), 821–850. https://doi.org/10.1177/0895904808325180

Desimone, L. M., & Garet, M. S. (2015). Best practices in teacher's professional development in the United States. *Psychology, Society, & Education*, *7*(3), 252–263.

Field, A. (2016). *Discovering statistics using IBM SPSS statistics* (5th ed.). Sage Publications.

Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research*, *74*(1), 59–109. https://doi.org/10.3102/00346543074001059

Goddard, R. D., Goddard, Y. L., & Tschannen-Moran, M. (2007). A multilevel analysis of the relationship between collective efficacy and students' academic achievement. *Journal of Educational Psychology*, *99*(3), 577–590. https://doi.org/10.1037/0022-0663.99.3.577

Grangeat, M., & Gray, P. (2020). Changing teacher collaboration to promote the integration of key competencies in the curriculum. *European Journal of Teacher Education*, *43*(2), 159–175. https://doi.org/10.1080/02619768.2019.1681967

Gruman, J. A., & Saks, A. M. (2011). Performance management and employee engagement. *Human Resource Management Review*, *21*(2), 123–136. https://doi.org/10.1016/j.hrmr.2010.09.004

Guskey, T. R. (2002). Professional development and teacher change. *Teachers and Teaching: Theory and Practice*, *8*(3), 381–391. https://doi.org/10.1080/135406002100000512

Hakanen, J. J., Bakker, A. B., & Schaufeli, W. B. (2006). Burnout and work engagement among teachers. *Journal of School Psychology*, *43*(6), 495–513. https://doi.org/10.1016/j.jsp.2005.11.001

Harper-Hill, K., Beamish, W., Hay, S., Whelan, M., Kerr, J., Zelenko, O., & Villalba, C. (2022). Teacher engagement in professional learning: What makes the difference to teacher practice? *Studies in Continuing Education*, *44*(1), 105–118. https://doi.org/10.1080/0158037X.2020.1781611

Harris, A., Jones, M., & Ismail, N. (2025). Teacher leadership and school/system change: Exploring the contemporary evidence. *International Journal of Education Policy and Leadership*, *21*(3), Article 1589. https://doi.org/10.22230/ijepl.2025v21n3a1589

Hofstede, G. (1980). *Culture's consequences: International differences in work-related values*. Sage Publications.

Ji, Y. (2021). Does Teacher Engagement Matter? Exploring Relationship between Teachers' Engagements in Professional Development and Teaching Practice. International Journal of TESOL Studies, 3(4), 42–60. https://doi.org/10.46451/ijts.2021.12.04

Joyce, B., & Showers, B. (2002). *Student achievement through staff development* (3rd ed.). ASCD.

Kelchtermans, G. (2019). Teacher collaboration and collegiality as workplace conditions. *Zeitschrift für Erziehungswissenschaft*, *22*(3), 237–256. https://doi.org/10.1007/s11618-019-00858-1

Kennedy, M. M. (2016). How does professional development improve teaching? *Review of Educational Research*, *86*(4), 945–980. https://doi.org/10.3102/0034654315626800

Kim, Y. H., & Park, I. K. (2020). The effect of teachers' professional development on job satisfaction and commitment: The mediating role of teacher efficacy. *International Journal of Educational Research*, *99*, 101504.

Klassen, R. M., Perry, N. E., & Frenzel, A. C. (2012). Teachers' relatedness with students: An underemphasized component of teachers' basic psychological needs. *Journal of Educational Psychology*, *104*(1), 150–165.

Kyndt, E., Gijbels, D., Grosemans, I., & Donche, V. (2020). Teachers' everyday professional development: Mapping informal learning activities, antecedents, and learning outcomes. *Review of Educational Research*, *86*(4), 1111–1150. https://doi.org/10.3102/0034654315627864

Miao, R. T. (2011). Perceived organizational support, job satisfaction, task performance and organizational citizenship behavior in China. *Journal of Behavioral and Applied Management*, *12*(2), 105–127. http://dx.doi.org/10.21818/001c.17632

Perera, H. N., Granziera, H., & McIlveen, P. (2018). Profiles of teacher personality and relations with teacher self-efficacy, work engagement, and job satisfaction. *Personality and Individual Differences*, *120*, 171–178. https://doi.org/10.1016/j.paid.2017.08.034

Ronfeldt, M., Farmer, S. O., McQueen, K., & Grissom, J. A. (2015). Teacher collaboration in instructional teams and student achievement. *American Educational Research Journal*, *52*(3), 508–536. https://doi.org/10.3102/0002831215585560

Saks, A. M. (2006). Antecedents and consequences of employee engagement. *Journal of Managerial Psychology*, *21*(7), 600–619. https://doi.org/10.1108/02683940610690169

Saks, A. M., & Gruman, J. A. (2014). What do we really know about employee engagement? *Human Resource Development Quarterly*, *25*(2), 155–182. https://doi.org/10.1002/hrdq.21187

Salanova, M., Agut, S., & Peiró, J. M. (2005). Linking organizational resources and work engagement to employee performance and customer loyalty: The mediation of service climate. *Journal of Applied Psychology*, *90*(6), 1217–1227. https://doi.org/10.1037/0021-9010.90.6.1217

Schaufeli, W. B., Bakker, A. B., & Salanova, M. (2006). The measurement of work engagement with a short questionnaire: A cross-national study. *Educational and Psychological Measurement*, *66*(4), 701–716. https://doi.org/10.1177/0013164405282471

Schaufeli, W. B., Salanova, M., González-Romá, V., & Bakker, A. B. (2002). The measurement of engagement and burnout: A two-sample confirmatory factor analytic approach. *Journal of Happiness Studies*, *3*(1), 71–92. https://doi.org/10.1023/A:1015630930326

Shrestha, D. (2024). Education system in Nepal: A comparative study of public and private schools. *Far Western Review*, *2*(2), 39–57. https://doi.org/10.3126/fwr.v2i2.79824

Shuck, B., & Reio, T. G. (2014). Employee engagement and well-being: A moderation model and implications for practice. *Journal of Leadership & Organizational Studies*, *21*(1), 43–58. https://doi.org/10.1177/1548051813494240

Skaalvik, E. M., & Skaalvik, S. (2010). Teacher self-efficacy and teacher burnout: A study of relations. *Teaching and Teacher Education, 26*(5), 1059–1069. https://doi.org/10.1016/j.tate.2009.11.001

Tabachnick, B. G., & Fidell, L. S. (2013). *Using multivariate statistics* (6th ed.). Pearson.

Tamang, S., & Mishra, A. K. (2022). Green-HRM trends and their effects on educational institutions workplace. *Journal of Advanced Research in HR and Organizational Management*, *9*(3&4), 1–5. https://doi.org/10.24321/2454.3268.202201

Tamang, S., Mishra, A. K., & Ghosh, A. (2025). Moderating effect of fairness in the relationship between job conditions and emotional engagement. *International Journal of Environmental Sciences*, *11*(16s), 600–613. https://doi.org/10.64252/73c0nn13

Tamang, S., Mishra, A. K., Ghosh, A., & Bhaumik, A. (2024). Organisational support and teachers' engagement for professional development in secondary schools of Nepal. *Jurnal Ilmiah Ilmu Terapan Universitas Jambi*, *8*(2), 647–665. https://doi.org/10.22437/jiituj.v8i2.32414

Vangrieken, K., Dochy, F., Raes, E., & Kyndt, E. (2015). Teacher collaboration: A systematic review. *Educational Research Review*, 15, 17–40. https://doi.org/10.1016/j.edurev.2015.04.002

Vescio, V., Ross, D., & Adams, A. (2008). A review of research on the impact of professional learning communities on teaching practice and student learning. *Teaching and Teacher Education*, *24*(1), 80–91. https://doi.org/10.1016/j.tate.2007.01.004

Xanthopoulou, D., Bakker, A. B., Demerouti, E., & Schaufeli, W. B. (2011). Work engagement and financial returns: A diary study on the role of job and personal resources. *Journal of Occupational and Organizational Psychology*, *82*(1), 183–200. https://doi.org/10.1348/096317908X285633

Zhou, X., Shu, L., Xu, Z., & Padrón, Y. (2023). The effect of professional development on in-service STEM teachers' self-efficacy: A meta-analysis of experimental studies. *International Journal of STEM Education, 10*, Article 37. https://doi.org/10.1186/s40594-023-00422-x