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Pedagogical Content Knowledge and Job Motivation in School Teachers: The Mediating Role of Teaching Efficacy

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Abstract

The present study explored the relational dynamics of pedagogical content knowledge, teaching efficacy, and job motivation in school teachers. Directed by the published literature, it was postulated that a) there would be a positive relationship among teaching efficacy, pedagogical content knowledge and job motivation, b) teaching efficacy and pedagogical content knowledge would predict job motivation and, c) teaching efficacy would mediate between pedagogical content knowledge and job motivation. After observing all stipulated ethical considerations, a purposive sample of 220 school teachers (n = 117 men, n = 103 women) with an age range of 20-50 years *(*M=33.54*,* SD=4.54*)* was recruited for this cross-sectional correlational research. Tools used were demographic information sheet, teacher sense of efficacy scale (short form), STEM pedagogical content knowledge scale and motivation at work scale. Findings showed that there was a significant negative relationship between teaching efficacy and pedagogical content knowledge, and between job motivation and pedagogical content knowledge in teachers. Moreover, pedagogical content knowledge was a significant predictor of job motivation and teaching efficacy mediated the relationship between pedagogical content knowledge and job motivation. Other than facilitating occupational and educational psychologists in their work with teachers, current findings can also be incorporated into policymaking of the education sector.

Keywords: Mediation, Motivation, Pedagogical Content Knowledge, School Teachers, Teaching Efficacy

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Introduction

The ability of every nation depends upon their teachers as they enable students to accomplish their goals (Barni et al., 2019). But to be an efficient teacher, one needs to continuously seek specialized professional training to meet meticulous standards so that they can accomplish their academic obligations to the best of their abilities (Hafeez, 2021). It is hence pertinent to equip teachers with the best pedagogical content knowledge (PCK) which will also increase their teaching efficacy (TE) and might keep them motivated towards their work in the long run. This was the reason in this paper; we investigated the interrelational aspects of PCK, TE and job motivation (JM) in school teachers.

Pedagogical Content Knowledge

No one can deny the fact that to be a good teacher, one needs to possess characteristics other than just having the knowledge and expertise in a particular subject as a better comprehension of the teaching and learning process, identification of students' needs and shortcomings and the capacity to implement effective PCK have the equal worth (Ai et al., 2022). It was Shulman (1986) who initially presented the idea of

PCK and argued that both content knowledge (CK) and pedagogical knowledge (PK) couldn't be mutually exclusive. Instead, he proposed PCK as a special kind of teacher knowledge that combined subject-specific knowledge with effective teaching strategies and teachers could gradually acquire PCK through their experiences. It consisted of the following essential components: (1) information about the subject matter; (2) an understanding of how students came to understand the material; (3) procedures; (4) information about the educational plan; (5) information about instructional settings; and (6) information about the purpose of training (Shulman, 1986).

Similarly, Andrew et al. (2019) reported that PCK was a teacher's assessment of how well they conceptually translated their subject-matter knowledge to help pupils. For teachers who were well-developed, PCK could be very effective; however, they must be aware of its drawbacks (Dong et al., 2020). Good PCK could be developed by teachers in all fields of education, which would improve their ability to teach and motivation for their work (Kim et al., 2018). Moreover, it was different from CK which was based on the teacher's understanding of the subject being taught whereas PCK was the sort of information which was expected to make the topic more open to the students (Andyani et al., 2020).

Teaching Efficacy

While self-efficacy indicates someone's belief in their ability to accomplish a particular performance-based task, a teacher's self-efficacy refers to their ability to enhance the performance of their students and/or supervisees (Bandura, 1986; Tschannen-Moran & Hoy, 2007). It denotes the educator's confidence in their capacity to effectively and efficiently create and maintain a teaching and learning environment (Burić & Moè, 2020). This was the reason; TE seemed to influence the whole teaching and learning process of the students (Granziera & Perera, 2019). Likewise, instructors who considered themselves highly competent tended to foster a learning environment in which students learnt more efficiently (Yada et al., 2019). Hoogsteen (2020) found TE to be increased with an increase in the performance of students. However, it had been observed that TE had been significantly influenced by the motivation levels of instructors (Bandura, 1986; Lazarides et al., 2018). Interestingly, this JM enhanced by self-efficacy was mainly based on perceived competence rather than actual skill (Hoogsteen, 2020). In addition to imparting the necessary knowledge, teaching objectives might also include encouraging one another. As a result, it was critical to assess instructors' self-efficacy, look at potential influencing elements, and consider how self-efficacy may affect teacher's knowledge and future JM.

Job Motivation

One of the most important aspects of the educational process is the teacher's motivation. By cultivating motivation, the educational quality could be raised hence accomplishing academic goals more rapidly (Johnson, 2017). Eliyana et al. (2018) elaborated that motivation was one's readiness to put dedicated efforts into achieving a particular objective. Research had indicated two aspects of motivation; firstly the extrinsic motivation that emerged from external circumstances and sources, and secondly the intrinsic motivation that drove people to undertake certain actions and came from their inner self (Deci et al., 1991). When taken as a conceptual whole, both of these types influenced how people behave in their lives (Aytaç, 2021). Thus, it was reasonable to argue that motivation was the cornerstone of the academic experience and involved a process of behavioural change (Skaalvik & Skaalvik, 2019). In this sense, the JM of teachers impacted the overall quality of education as they influenced students by employing integrated teaching approaches and putting efforts into their command of subject matter and pedagogy. This JM further increased the academic motivation of their students

(Engin, 2020). Moreover, that motivation was associated with every factor influencing the student during the educational process and the teacher was directly tied to all of these components (Yıldız & Kilic, 2021).

Literature Review

Teaching is a human undertaking with many facets that involve the intricate, real-time interaction of several knowledge types. Improving student learning achievement required teachers to possess pedagogical competence, reasoning, and knowledge (Jacob et al., 2020). Research indicated that successful classrooms and schools depend on the presence and maintenance of high self-efficacy in teachers (Poulou et al., 2019). Notably, the positive TE affected the school climate by boosting its learning environment (Johansson & Johansson, 2021). It had also been observed that TE not only improved the performance and motivation of teachers but it also created positive outcomes for students (Alibakhshi et al., 2020).

In a study, Reppa et al. (2023) reported a causal relationship between the JM of teachers and their sense of self-efficacy. Similarly, those educators who possessed a high degree of self-efficacy showed increased JM, decreased job-related stress, and experienced fewer challenges while dealing with disruptive children (Barni et al., 2019). Moreover, TE had also been linked with students' engagement in behavioural, emotional, and cognitive domains (Burić, 2019); teachers' decreased job stress (Burić & Moè, 2020) and enhanced JM (Alexander et al., 2020).

Furthermore, the research found that teachers who showed stronger PCK-based self-efficacy managed the classroom in a better way (Rafiq et al., 2022). Satrio and Sahid (2023) argued that PCK assisted prospective teachers to keep on learning which improved their willingness to learn and academically developed themselves as they would feel more efficacious in imparting effective learning. Since PCK was found to have a strong correlation with JM and TE, studies had concentrated on developing better interventions to develop PCK (Mesci et al., 2020) and demonstrating its impacts (Kim et al., 2018). According to the findings of a different study, student achievement and student interest were positively correlated with instructor competence (pedagogical subject knowledge, self-efficacy, and teaching excitement) (Fauth et al., 2019).

Numerous research studies conducted globally had also looked at the relationships between job motivation and teacher self-efficacy. For example, it was discovered that, via the mediation of work engagement, the self-efficacy of teaching assistants was positively correlated with job satisfaction (Chan et al., 2020). There were four different personality profiles of instructors that emerged from latent profile assessments of teachers: "rigid," "ordinary," "well-adjusted," and "excitable." The findings, which supported the validity of the profiles, showed that instructors who were very excitable had the lowest job satisfaction. According to Perera et al. (2018), there was a significant difference in job satisfaction between both profiles, with ordinary teachers expressing much lower satisfaction. Moreover, in a Turkish study, the authors not only established the associations between motivation and self-efficacy with autonomous learning, but they also demonstrated the predictive abilities of these variables with autonomous learning (Alkan & Arslan, 2019).

Empirical evidence supporting the positive correlation between motivation and self-efficacy had been presented in numerous studies. According to Grigg et al. (2018), a student's self-efficacy affected their motivation to study and their level of interest in a subject. Additionally, self-efficacy was favorably predicted by teachers' work involvement (Li et al., 2019). Students' academic self-efficacy arose when they evaluated their own work and received regular, prompt feedback on the tasks they completed. A person's ability

to choose tasks and level of commitment was influenced by their awareness of their efficacy; the more capable they felt, the more likely they were to take on challenging tasks (Affuso et al., 2022).

As previously indicated, various knowledge-related factors might have an impact on teachers' motivation for their jobs. Few research, nevertheless, had looked at the methods and procedures by which various facets of a teacher's subject-matter expertise interacted to affect their motivation for their jobs. The mediating role of teaching efficacy had received increased attention in recent times. According to Huang et al. (2020), a study revealed that the impacts of cultural barriers and learning-centered leadership on teacher professional learning were considerably mediated by teacher self-efficacy. A meta-analytic structural equation modeling investigation with 114 empirical studies, carried out by Scherer et al. (2019) to look into the possible impacts of teachers' motivating beliefs (such as self-efficacy and utility-value) on their desire to use technology, discovered that teachers' desire to use technology in the classroom was strongly predicted by their combined motivational beliefs of self-efficacy and utility-value.

Backfisch et al. (2020) used a MANOVA to examine possible disparities in teachers' motivational beliefs. Results showed that regarding TPACK self-efficacy, planned contrasts showed that in-service teachers had greater levels of TPACK self-efficacy beliefs than trainee instructors. According to another study, teachers' professional engagement was found to be mediated by autonomous motivation and emotional characteristics in relation to digital self-efficacy and support for innovation (Moreira-Fontán et al., 2019). Moreover, Qadach et al. (2019) verified that the principal's instructional leadership and a teacher's intention to resign are significantly mediated by shared vision and collective teacher efficacy. Similarly, in Chinese academics, emotions in teaching statistically predicted teaching styles, both directly and indirectly through academic self-efficacy (Zhang et al., 2018).

In a study, Dong et al. (2020) revealed that PCK positively predicted JM in teachers. Moreover, pedagogical content understanding was found to be influenced by instructional efficacy views (Richardson et al., 2018). Similarly, PCK was discovered to affect the JM of teachers through an intermediation of the TE (Woon, 2018). Also, a study found that the TE of pre-service teachers partially mediated the association between PCK and teaching anxiety. This meant that the pre-service teachers' TE increased with a high level of PCK which eventually reduced their anxiety (Aksu & Kul, 2019).

Present Study

Understanding that good teaching involved more than just imparting knowledge, this paper focused on PCK, TE and JM and aimed to understand their interrelationships within an indigenous setting. Therefore, this paper undertook the following objectives: (a) to determine the relationship between PCK, TE and JM; (b) to probe whether PCK and TE predict JM; and (c) to investigate the mediating role of TE between PCK and JM in school teachers.

Hypotheses

There would be a positive relationship between teaching efficacy, pedagogical content knowledge and job motivation in teachers.

Teaching efficacy and pedagogical content knowledge would positively predict job motivation in teachers.

Teaching efficacy would likely mediate the relationship between pedagogical content knowledge and job motivation in teachers.

Method

Participants

Following institutional and ethical guidelines for research, a purposive sample of 220 school teachers (n = 103 women, n = 117 men) was recruited from various schools and academies of Lahore and were teaching STEM (Science, Technology, Engineering and Mathematics) subjects.

Only those participants were included in the final sample who formally consented to be a part of this study and completed the questionnaires. Data was coded anonymously to maintain the sample's privacy. Results were generated through SPSS version 22 and were further interpreted in the context of the body of existing research.

Measures

The following assessment measures were used in the current study.

Demographic Information Sheet

A demographic information sheet was used to gather basic information regarding participants' socio-demographics including their age, gender, income, qualification, years of teaching experience, and the class level they taught.

Teacher Sense of Efficacy Scale (Short Form)

12-item Teacher Sense of Efficacy Scale (TSES-Short Form; Tschannen-Moran & Hoy, 2007) which was used in this study. A 9-point Likert scale, with 1 denoting nothing, 3 very little, 5 some degree, 7 quite a bit, and 9 indicating a great lot, was used by teachers to give their opinions on the 12 statements. "To what extent can you manage disruptive behaviour in the classroom?" is one of the questions on this assessment. To what degree are you able to create well-crafted questions for your students? How much are you able to employ a range of evaluation strategies? How much can you do to help children believe they can perform well on schoolwork? TSES has a .90 alpha reliability.

STEM Pedagogical Content Knowledge Scale

The STEMPCK Scale was designed to assess teachers' STEM-based knowledge by modifying items from Yildirim and Sahin (2019). The three primary elements of the STEMPCK questionnaire were 21st-century learning (14 items), STEM integration knowledge (science - 8 items, technology - 7 items, engineering - 7 items, and mathematics - 8 items), and pedagogical knowledge (12 items). The Likert Scale 5-point (1 through 5) is used to present the items. The factors' Cronbach's Alpha upsides varied from 0.88 to 0.90, whereas the relationships between the adjusted full scores ranged from 0.31 to 0.89. The pedagogical information has a .87 reliability rating.

Motivation at Work Scale

Job motivation was assessed by using a 12-item Motivation at Work Scale (MAWS; Gagné et al., 2010) and comprised of four subscales namely external regulation, introjection, identification, and intrinsic motivation. Scores are averaged to get an overall score and rated on a 7-point Likert format with 1 indicating ‘not at all’ to 7 denoting ‘exactly’. The alpha indices range from .69 to .93 for its subscales.

Results

An overview of the sample indicated that most of the teachers were men (53.2%), had a master’s degree (46.4%), had been teaching higher classes (35.5%) for at least 10 years (70.5%) and had earned at least 30,000 PKR and below (71%). Meanwhile, reliability analysis showed that the TE scale had a value of .74 while the PCK scale had a value of .78, however, the JM scale had a relatively lower alpha value (.56).

Table 1

Correlation Analysis of Study Variables (N=220)

	Variables	*M*	*SD*	1	2	3
1	PCK	18.31	5.29	-	-.16*	-.33***
2	JM	18.08	3.89		-	-.08
3	TE	17.65	3.64			-

Note. *p<.05, ***p<.001; PCK = Pedagogical Content Knowledge; JM = Job Motivation; TE = Teaching Efficacy

Table 1 revealed a significant negative relationship between PCK, JM and TE which meant that with an increase in PCK, a decrease was observed in both TE and JM in school teachers. However, no significant relationship was found between JM and TE.

Table 2

Multiple Regression of PCK and TE (N=220)

						95% CI	
Variables	***B***	***S.E***	***β***	***T***	***p***	***LL***	***UL***
PCK	-.506	.181	-.205	-2.789	.006	-.863	-.148
TE	-.207	.107	-.137	-1.928	.055	-.418	.005

Note. PCK = Pedagogical Content Knowledge; TE = Teaching Efficacy

Table 2 revealed the impact of PCK and TE in JM in teachers. The results indicated that while PCK (β = -.20, p <.001) negatively predicted JM, TE (β = -.14, p >.05) did not predict JM.

Table 3

Regression Analysis for Mediation of TE between PCK and JM (N=220)

Variables	***B***	**95%CI**		***SE B***	***B***	$\mathbf{R^2}$	$\mathbf{\Delta R^2}$
Step 1		***LL***	***UL***			.03	.03*
Constant	92.31	87.01	97.61	2.69			
PCK	-.39*	-.80	-.07	.16	-.16*		
Step 2						.04	.02*
Constant	106.32	92.01	120.63	7.26			
PCK	-.51**	-.85	-.17	.17	-.21**		
TE	-.22*	-.43	-.01	.11	-.15*		

Note: **p<.01, ***p<.001, CI= Confidence Interval; PCK = Pedagogical Content Knowledge; TE = Teaching Efficacy

Table 3 reveals the mediating role of TE between PCK and JM using hierarchical regression analysis. In step 1, an R^2 value of .03 revealed that PCK explained 3% variance in JM with F (1, 218) = 5.67, p < .05. Moreover, PCK negatively predicted JM (β= -.16, p < .05). In Step 2, the R^2 value of .04 indicated that the PCK and TE explained 4% variance in JM with F (2, 217)=5.03, p < .01. Furthermore, both PCK and TE negatively predicted JM with β= -.21, p < .01 and β= -.15, p < .05, respectively. The ΔR^2 value of .02 revealed that 2% change in variance of step 1 and step 2 with ΔF (1, 217) = .04, p < .05. The β of PCK changed from step 1 to step 2 (.16 to .21) but remained significant which confirmed a partial mediation, but having a very negligible impact. Hence, moderation analysis was run using regression analysis to check if TE acted as a moderator.

Table 4
Moderation of TE between PCK and JM (N=220)

Variables	Model 1			Model 2		
	B	**β**	**SE**	**B**	**β**	**SE**
Constant	86.06		.59	85.61		.62
PCK	-1.84	-.21**	.62	-2.57	-.29***	.71
TE	-1.29	-.15*	.62	-1.08	-.12	.63
PCK × TE				-1.38	-.17*	.64
R^2	.04				.64	
ΔR^2					.02	

Note: **p<.01, ***p<.001, PCK = Pedagogical Content Knowledge; TE = Teaching Efficacy

Table 4 shows the moderation of TE between PCK and JM. In Model 1, the R^2 value of .04 revealed that the predictors explained 4% variance in the outcome with $F(2,217)=5.03$, $p<.01$. The findings revealed that PCK (β=-.21, p<.01). In Model 2, the R^2 value of .06 revealed that the predictors explained 6% variance in the outcome with $F(1,216)=4.93$, $p<.05$. The findings revealed that PCK (β=-.29, $p<.001$), TE (β=-.12, $p>.05$) and PCK × TE negatively predicted JM (β=-.17, $p<.05$). The ΔR^2 value of .02 revealed 2% change in the variance of model 1 and model 2 with $\Delta F\ (1, 216) =4.57$, $p<.05$. Findings showed that TE moderated the relationship between PCK and TE.

Discussion

The goal of this paper was to explore the relational dynamics of pedagogical content knowledge, teaching efficacy, and job motivation in school teachers. In our study, it was hypothesized that there would be a positive relationship among PCK, JM and TE. While our findings suggested that all the study variables were related to each other as also reported by previous scholars (Aksu & Kul, 2019; Liu et al., 2022; Thomson et al., 2017); however it was observed in this study that there was a significant negative relationship between PCK and TE, and PCK and JM. It can be argued that teachers with extensive PCK might face higher expectations from themselves and others, resulting in increased stress and potential burnout. Hence this heightened perceived pressure can inversely impact their motivation and belief in their teaching effectiveness. A similar result was also reported by Robinson et al. (2022) who observed that teachers with PCK who experienced stressors related to their personal and professional roles, and concerns for students' well-being experienced low JM and deterioration in their mental well-being. Moreover, teachers' self-efficacy was not immediately impacted by their knowledge of technological pedagogical content, as demonstrated by Andyani et al. (2020).

Furthermore, it was hypothesized that PCK and TE would predict JM in teachers. Our results showed that PCK predicted JM in school teachers which was congruent with another study by Keller et al. (2016) which revealed that while teacher motivation emerged as a key influence on students' interest, their pedagogical subject understanding significantly predicted their own JM. However, we found that PCK negatively predicted job motivation in teachers which was incongruent with previous studies (Maryani & Martaningsih, 2016). It can be argued that teachers with a strong focus on PCK might prioritize content mastery to the detriment of other aspects of teaching including JM. In a study, D'Elisa (2015) indicated that though teachers with high knowledge endorsed motivation as an important part of their teaching, they did not indicate a desire to obtain further professional development in this area, which seems to justify our finding. Our study results did not find TE as

predictor of JM. It was incongruent with previous studies as studies reported that TE would predict job motivation in teachers (Bicer, 2023; Naheed & Iqbal, 2016; Reddy, 2019).However, one study showed that extrinsic motivations had limited to no relationship to self-efficacy (Calkins et al., 2023).This could be explained by the presence of individual differences among participants, such as prior experiences, personal goals, and intrinsic motivation levels, which could have played a significant role in shaping their job motivation, overshadowing the impact of teaching efficacy.

Lastly, it was hypothesized that TE would mediate the relationship between PCK and JM. Our results showed TE to be a partial mediator for the interaction between PCK and JM and even though variance was almost negligible, as per our knowledge, there is not any research indicating such a phenomenon, however, the potential for this finding seemed plausible from a few studies like Aksu and Kul (2019) found that TE mediated the association between teaching anxiety and PCK in teachers. They reported that pre-service teachers' efficacy rises when their PCK is high, and their anxiety falls. Likewise, it was discovered that the relationship between teaching beliefs, attitudes toward teaching, and motivation to teach was mediated by teaching self-efficacy (Bas, 2022).

Limitations and Recommendations

As the present study estimated PCK across school teachers teaching STEM-related subjects, future studies can go beyond these specific subject teachers and may include teachers serving at the college and university levels for comparative analysis. Moreover, as the study variables seemed to have an inverse relationship with each other, a follow-up study or a qualitative study can be conducted to better explore and understand this dynamism.

Implications

One of the major implications of this paper is the fact that our sample indicated a negative correlation and prediction across the study variables, which is in contrast to most of the research scholars. While this is an indigenous finding and needs further exploration for better comprehension, it did highlight the fact that the interrelations between PCK, TE and JM are rather different in our culture. This can also benefit educational and occupational psychologists in their work with academicians and in academic settings who always regard a positive interaction between these variables. Moreover, policymakers can also incorporate these findings into their future policies so that a long-term positive interaction can be achieved by working on these constructs.

Contribution of Authors

Faiz Younas: Conceptualization, Methodology, Writing - Reviewing & Editing, Supervision

Rabia Javed: Conceptualization, Investigation, Data Curation, Formal Analysis, Writing – Original Draft

Vicar Solomon: Methodology, Writing - Reviewing & Editing

Conflict of Interest

There is no conflict of interest declared by the authors.

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Data Availability Statement

The datasets of the current study are not available publicly due to ethical reasons but are available from the corresponding author [V.S.] upon the reasonable request.

References

Affuso, G., Zannone, A., Esposito, C., Pannone, M., Miranda, M. C., De Angelis, G., Aquilar, S., Dragone, M., & Bacchini, D. (2022). The effects of teacher support, parental monitoring, motivation and self-efficacy on academic performance over time. *European Journal of Psychology of Education*, *38*. https://doi.org/10.1007/s10212-021-00594-6

Ai, J., Zhang, J., Horn, E., Liu, H., Huang, J., & Ma, Y. (2022). Examination of Chinese teachers' attitudes towards inclusive education. *Journal of International Special Needs Education*, *25*(2). https://doi.org/10.9782/jisne-d-21-00004

Aksu, Z., & Kul, Ü. (2019). The mediating role of mathematics teaching efficacy on the relationships between pedagogical content knowledge and mathematics teaching anxiety. *SAGE Open*, *9*(3). https://doi.org/10.1177/2158244019871049

Alexander, C., Wyatt-Smith, C., & Du Plessis, A. (2020). The role of motivations and perceptions on the retention of inservice teachers. *Teaching and Teacher Education*, *96*, 1–12. https://doi.org/10.1016/j.tate.2020.103186

Alibakhshi, G., Nikdel, F., & Labbafi, A. (2020). Exploring the consequences of teachers' self-efficacy: a case of teachers of English as a foreign language. *Asian-Pacific Journal of Second and Foreign Language Education*, *5*(1). https://doi.org/10.1186/s40862-020-00102-1

Alkan, M. F., & Arslan, M. (2019). Learner autonomy of pre-service teachers and its associations with academic motivation and self-efficacy. *Malaysian Journal of Learning and Instruction*, *16*(2), 75–96. https://doi.org/10.32890/mjli2019.16.2.3

Andrew, J., Toropova, A., & Myrberg, E. (2019). Teacher job satisfaction: the importance of school working conditions and teacher characteristics. *Educational Review*, *73* (1), 71-97 https://doi.org/10.1080/00131911.2019.1705247

Andyani, H., Setyosari, P., Wiyono, B. B., & Djatmika, E. T. (2020). Does technological pedagogical content knowledge impact on the use of ICT in pedagogy? *International Journal of Emerging Technologies in Learning (IJET)*, *15*(3), 126-139. https://doi.org/10.3991/ijet.v15i03.11690

Aytaç, A. (2021). A study of teachers' self-efficacy beliefs, motivation to teach, and curriculum fidelity: A path analysis model. *International Journal of Contemporary Educational Research*, *8*(4), 130-143. https://doi.org/10.33200/ijcer.898186

Backfisch, I., Lachner, A., Hische, C., Loose, F., & Scheiter, K. (2020). Professional knowledge or motivation? Investigating the role of teachers' expertise on the quality of technology-enhanced lesson plans. *Learning and Instruction*, *66*, 101300. https://doi.org/10.1016/j.learninstruc.2019.101300

Bandura, A. (1986). Fearful expectations and avoidant actions as co-effects of perceived self-inefficacy. *American Psychologist*, *41*(12), 1389–1391. https://doi.org/10.1037/0003-066x.41.12.1389

Barni, D., Danioni, F., & Benevene, P. (2019). Teachers' self-efficacy: the role of personal values and motivations for teaching. *Frontiers in Psychology*, *10*, 1645. https://doi.org/10.3389/fpsyg.2019.01645

Bas, G. (2022). Effect of student teachers' teaching beliefs and attitudes towards teaching on motivation to teach: Mediating role of self-efficacy. *Journal of Education for Teaching*, *48*(3), 348-363. https://doi.org/10.1080/02607476.2021.2006043

Bicer, N. (2023). Evaluation of self-efficacy and job satisfaction of teachers teaching turkish as a foreign language. *SAGE Open*, *13*(3). https://doi.org/10.1177/21582440231196993

Burić, I. (2019). The role of emotional labor in explaining teachers' enthusiasm and students' outcomes: A multilevel mediational analysis. *Learning and Individual Differences*, *70*, 12–20. https://doi.org/10.1016/j.lindif.2019.01.002

Burić, I., & Moè, A. (2020). What makes teachers enthusiastic: The interplay of positive affect, self-efficacy and job satisfaction. *Teaching and Teacher Education*, *89*, 103008. https://doi.org/10.1016/j.tate.2019.103008

Calkins, L., Wiens, P., Parker, J., & Tschinkel, R. (2023). Teacher motivation and self-efficacy: How do specific motivations for entering teaching relate to teacher self-efficacy? *Journal of Education*, *204*(2). https://doi.org/10.1177/00220574221142300

Chan, E. S. S., Ho, S. K., Ip, F. F. L., & Wong, M. W. Y. (2020). Self-Efficacy, work engagement, and job satisfaction among teaching assistants in Hong Kong's inclusive education. *SAGE Open*, *10*(3). https://doi.org/10.1177/2158244020941008

Deci, E. L., Vallerand, R. J., Pelletier, L. G., & Ryan, R. M. (1991). Motivation and education: the self-determination perspective. *Educational Psychologist*, *26*(3-4), 325–346. https://doi.org/10.1080/00461520.1991.9653137

D'Elisa, T. (2015). *Student motivation: Teacher perceptions, beliefs and practices* (No. 338) [Doctoral dissertation, Philadelphia College of Osteopathic Medicine]. Digital Commons. https://digitalcommons.pcom.edu/psychology_dissertations/338/

Dong, Y., Xu, C., Chai, C. S., & Zhai, X. (2020). Exploring the structural relationship among teachers' technostress, technological pedagogical content knowledge (TPACK), computer self-efficacy and school support. *The Asia-Pacific Education Researcher*, *29*(2), 147–157. https://doi.org/10.1007/s40299-019-00461-5

Eliyana, A., Sawitri, D., & Bramantyo, H. (2018). Is job performance affected by job motivation and job satisfaction? *KnE Social Sciences*, *3*(10), 911-920. https://doi.org/10.18502/kss.v3i10.3435

Engin, G. (2020). An examination of primary school students' academic achievements and motivation in terms of parents' attitudes, teacher motivation, teacher self-efficacy and leadership approach. *International Journal of Progressive Education*, *16*(1), 257-276. https://doi.org/10.29329/ijpe.2020.228.18

Fauth, B., Decristan, J., Decker, A.-T., Büttner, G., Hardy, I., Klieme, E., & Kunter, M. (2019). The effects of teacher competence on student outcomes in elementary science education: The mediating role of teaching quality. *Teaching and Teacher Education*, *86*(86), 102882. https://doi.org/10.1016/j.tate.2019.102882

Gagné, M., Forest, J., Gilbert, M. H., Aubé, C., Morin, E., & Malorni, A. (2010). The Motivation at Work Scale: Validation evidence in two languages. *Educational and*

Psychological Measurement, *70*(4), 628-646. https://doi.org/10.1177/0013164409355698

Granziera, H., & Perera, H. N. (2019). Relations among teachers' self-efficacy beliefs, engagement, and work satisfaction: A social cognitive view. *Contemporary Educational Psychology*, *58*, 75–84. https://doi.org/10.1016/j.cedpsych.2019.02.003

Grigg, S., Perera, H. N., McIlveen, P., & Svetleff, Z. (2018). Relations among math self efficacy, interest, intentions, and achievement: A social cognitive perspective. *Contemporary Educational Psychology*, *53*, 73–86. https://doi.org/10.1016/j.cedpsych.2018.01.007

Hafeez, M. (2021). Impact of teacher's training on interest and academic achievements of students by multiple teaching methods. *Pedagogical Research*, *6*(3), em0102. https://doi.org/10.29333/pr/11088

Hoogsteen, T. J. (2020). Collective efficacy: Toward a new narrative of its development and role in achievement. *Palgrave Communications*, *6*(2), 1-7. https://doi.org/10.1057/s41599-019-0381-z

Huang, L., Zhang, T., & Huang, Y. (2020). Effects of school organizational conditions on teacher professional learning in China: The mediating role of teacher self-efficacy. *Studies in Educational Evaluation*, *66*. https://doi.org/10.1016/j.stueduc.2020.100893

Jacob, F., John, S., & Gwany, D. M. (2020). Teachers' pedagogical content knowledge and students' academic achievement: A theoretical overview. *Journal of Global Research in Education and Social Science*, *14*(2), 14–44.

Johansson, C., & Johansson, A. L. (2021). *The impact of teachers' self-efficacy on their approach to teaching English as a second language and the strategies they perceive as effective for developing students' self-efficacy* [Master's thesis, Malmö University]. Diva Portal. https://www.diva-portal.org/smash/get/diva2:1554540/FULLTEXT02

Johnson, D. (2017). The role of teachers in motivating students to learn. *BU Journal of Graduate Studies in Education*, *9*(1), 46–49.

Keller, M. M., Neumann, K., & Fischer, H. E. (2016). The impact of physics teachers' pedagogical content knowledge and motivation on students' achievement and interest. *Journal of Research in Science Teaching*, *54*(5), 586–614. https://doi.org/10.1002/tea.21378

Kim, I., Ward, P., Sinelnikov, O., Ko, B., Iserbyt, P., Li, W., & Curtner-Smith, M. (2018). The influence of content knowledge on pedagogical content knowledge: an evidence-based practice for physical education. *Journal of Teaching in Physical Education*, *37*(2), 133–143. https://doi.org/10.1123/jtpe.2017-0168

Lazarides, R., Buchholz, J., & Rubach, C. (2018). Teacher enthusiasm and self-efficacy, student-perceived mastery goal orientation, and student motivation in mathematics classrooms. *Teaching and Teacher Education*, *69*, 1–10. https://doi.org/10.1016/j.tate.2017.08.017

Li, R., Liu, H., Chen, Y., & Yao, M. (2019). Teacher engagement and self-efficacy: The mediating role of continuing professional development and moderating role of

teaching experience. *Current Psychology*, *41*. https://doi.org/10.1007/s12144-019-00575-5

Liu, Y., Zhao, L., & Su, Y.-S. (2022). The impact of teacher competence in online teaching on perceived online learning outcomes during the COVID-19 outbreak: A moderated-mediation model of teacher resilience and age. *International Journal of Environmental Research and Public Health*, *19*(10), 6282. https://doi.org/10.3390/ijerph19106282

Maryani, I., & Martaningsih, S. T. (2016). Correlation between teacher's PCK and student's motivation in primary school in indonesia. *International Journal of Evaluation and Research in Education*, *4*(1), 38. https://doi.org/10.11591/ijere.v4i1.4490

Mesci, G., Schwartz, R. S., & Pleasants, B. (2020). Enabling factors of preservice science teachers' pedagogical content knowledge for nature of science and nature of scientific inquiry. *Science & Education*, *29*, 263–297. https://doi.org/10.1007/s11191-019-00090-w

Moreira-Fontán, E., García-Señorán, M., Conde-Rodríguez, Á., & González, A. (2019). Teachers' ICT-related self-efficacy, job resources, and positive emotions: Their structural relations with autonomous motivation and work engagement. *Computers & Education*, *134*, 63–77. https://doi.org/10.1016/j.compedu.2019.02.007

Naheed, K., & Iqbal, S. (2016). Relationship of motivation and self-efficacy with job satisfaction of teachers A case study of DG -khan education sector. *An International Peer-Reviewed Journal*, *15* (03). https://doi.org/10.1177/0143034318798045

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

Poulou, M. S., Reddy, L. A., & Dudek, C. M. (2019). Relation of teacher self-efficacy and classroom practices: A preliminary investigation. *School Psychology International*, *40*(1), 25–48. https://doi.org/10.1177/0143034318798045

Qadach, M., Schechter, C., & Da'as, R. (2019). Instructional leadership and teacher's intent to leave: The mediating role of collective teacher efficacy and shared vision. *Educational Management Administration & Leadership*, *48*(4), 174114321983668. https://doi.org/10.1177/1741143219836683

Rafiq, K. R. M., Yunus, M. M., & Susiati. (2022). Re-envisioning technological pedagogical content knowledge and online teaching readiness of English for foreign language pre-service teachers in language teacher education. *Frontiers in Psychology*, *13*. https://doi.org/10.3389/fpsyg.2022.927835

Reddy, V. (2019). The relation between the work motivation and job satisfaction of secondary school teachers. *Journal of Advanced Research in English and Education*, *04*(02), 17–21. https://doi.org/10.24321/2456.4370.201903

Reppa, G., Mousoulidou, M., Tzovla, E., Koundourou, C., & Christodoulou, A. (2023). The impact of self-

efficacy on the well-being of primary school teachers: a Greek-Cypriot study. *Frontiers in Psychology*, *14*. https://doi.org/10.3389/fpsyg.2023.1223222

Richardson, G. M., Byrne, L. L., & Liang, L. L. (2018). Making learning visible: Developing preservice teachers' pedagogical content knowledge and teaching efficacy beliefs in environmental education. *Applied Environmental Education & Communication*, *17*(1), 41–56. https://doi.org/10.1080/1533015x.2017.1348274

Robinson, L. E., Valido, A., Drescher, A., Woolweaver, A. B., Espelage, D. L., LoMurray, S., Long, A. C. J., Wright, A. A., & Dailey, M. M. (2022). Teachers, stress, and the COVID-19 pandemic: A qualitative analysis. *School Mental Health*, *15*. https://doi.org/10.1007/s12310-022-09533-2

Satrio, Y. D., & Sahid, S. (2023). The interplay of TPACK, self-efficacy, and career motivation among economics teachers: a mediation analysis. *Perspektivy Nauki I Obrazovaniâ*, *64*(4), 125–141. https://doi.org/10.32744/pse.2023.4.8

Scherer, R., Siddiq, F., & Tondeur, J. (2019). The technology acceptance model (TAM): A meta-analytic structural equation modeling approach to explaining teachers' adoption of digital technology in education. *Computers & Education*, *128*(1), 13–35. Sciencedirect. https://doi.org/10.1016/j.compedu.2018.09.009

Shulman, L. S. (1986). *Paradigms and programs*. Simon & Schuster.

Skaalvik, E. M., & Skaalvik, S. (2019). Teacher self-efficacy and collective teacher efficacy: Relations with perceived job resources and job demands, feeling of belonging, and teacher engagement. *Creative Education*, *10*(7), 1400–1424. https://doi.org/10.4236/ce.2019.107104

Thomson, M. M., DiFrancesca, D., Carrier, S., & Lee, C. (2017). Teaching efficacy: Exploring relationships between mathematics and science self-efficacy beliefs, PCK and domain knowledge among preservice teachers from the united-states. *Teacher Development*, *21*(1), 1–20. https://doi.org/10.1080/13664530.2016.1204355

Tschannen-Moran, M., & Hoy, A. W. (2007). The differential antecedents of self-efficacy beliefs of novice and experienced teachers. *Teaching and Teacher Education*, *23*(6), 944–956. https://doi.org/10.1016/j.tate.2006.05.003

Woon, K. J. (2018). The Structural model analysis of pedagogical content knowledge, teaching efficacy and teacher's attitude for childhood music education. *Journal of the Korea Academia Industrial Cooperation Society*, *19*(1), 270–278. https://doi.org/10.5762/kais.2018.19.1.270

Yada, A., Tolvanen, A., Malinen, O.P., Imai-Matsumura, K., Shimada, H., Koike, R., & Savolainen, H. (2019). Teachers' self-efficacy and the sources of efficacy: A cross-cultural investigation in Japan and Finland. *Teaching and Teacher Education*, *81*, 13–24. https://doi.org/10.1016/j.tate.2019.01.014

Yıldırım, B. &Şahin T. E. (2019). STEM pedagogical content knowledge scale (STEMPCK): A validity and reliability study. *Journal of STEM Teacher Education, 53*(2), 1-20. http://dx.doi.org/10.30707/JSTE53.2

Yıldız, V., & Kılıç, D. (2021). Investigation of the relationship between class teachers' motivation and job satisfaction. *International Online Journal of Education and Teaching, 8*(1), 119-131.

Zhang, L., Fu, M., Li, D. T., & He, Y. (2018). Emotions and teaching styles among academics: the mediating role of research and teaching efficacy. *Educational Psychology*, *39*(3), 370–394. https://doi.org/10.1080/01443410.2018.1520970