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RESEARCH PAPER

Effectiveness of Teachers' Metacognition in Developing Conducive Classroom Learning Environment

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ABSTRACT

The purpose of this study is to investigate the effectiveness of teachers' metacognitive abilities in developing a conducive classroom learning environment. The population of the study at hand comprised of public sector colleges of Punjab province and the sample was randomly selected from this population. The data were collected through two questionnaires, viz; PTMAQ and ICEQ. The collected data were analyzed through SPSS 20. The findings of the study reflect that teachers' metacognitive abilities have a significant relationship with the classroom learning environment. Moreover, results also indicate that teachers' metacognition has no significant difference in gender, discipline and teaching level. In contrast, teachers have significant differences in the classroom learning environment at gender, discipline and different teaching levels. Furthermore, results indicate that teachers' metacognition has a significant influence on developing a conducive classroom learning environment. Thus, the findings of this research suggest that there is a need to introduce an integrated teachers' professional development program that increases the awareness of metacognitive abilities among teachers and enables them to use these abilities in developing a conducive classroom learning environment.

Introduction

Teachers are the key stakeholders in the learning process. They have a significant impact on students' development and academic achievements. In every classroom, students have diverse abilities and learning needs (Forlin, & Chambers, 2017). Therefore, teachers need to adapt their teaching to meet these individual needs (Gilakjani, 2012). So, it is necessary to create a learning environment that is conducive, safe, and pleasant for the students. It facilitates the students to understand and effectively grasp the subject matter (Kuh, et, al., 2011). In order to ensure this, teachers should possess various abilities and a diverse range of teaching skills.

Apart from expertise in subject matter knowledge, a teacher must have the capability to motivate students to actively participate in the teaching-learning process (Rahman, 2014). Additionally, the literature demonstrates that developing conducive classroom learning environment is another important initiative to understand the students' characteristics. It also fosters the rapport between teachers and students (Hurtado, et, al., 2012). Similarly, developing positive relationships with students increases mutual respect between teachers and students and minimizes learners' disruptive behavior (Rusk, 2016). Consequently, it also helps the teachers to identify suitable teaching strategies for their classrooms. Moreover, teachers are responsible for overcoming the challenges of the learning process. In this regard, the creation of a supportive learning environment

encourages students' participation in academic activities and it also assists teachers in facilitating the learning process (Kumar & Sharma, 2016).

Several factors contribute to the conducive learning environment. These factors may involve; interaction and relationship between teachers and students, teachers' communication skills, Learners' participation, classroom management techniques, utilization of appropriate learning materials, reinforcement, teachers' emotional intelligence, self-efficacy and metacognition abilities (Patel, 2021). Among the aforementioned components of a conducive learning environment, teachers' metacognition is considered the most critical element in effective teaching (Thomas, 2013). Metacognition is the process of reflecting on one's thinking (Padmanabha, 2020). Teachers who use metacognitive techniques may help themselves to develop self-awareness, self-regulation, and self-monitoring skills. As a result, the use of these skills is a predictor of the creation of a conducive classroom learning environment that encourages students to engage and actively participate in the learning process (Ghanizadeh, 2017).

Teachers' use of metacognitive strategies, helps them to recognize the strengths and weaknesses of their students and adapt their teaching style to meet individual requirements (Marantika, 2021). This approach to teaching enhances student engagement, motivation, and academic performance (Caruth, 2018). Further, metacognition also plays a critical role in getting awareness of their thinking processes and allowing the teachers to take ownership of their teaching style (Branigan & Donaldson, 2020). Moreover, teachers who understand how students learn can adapt their teaching strategies to meet individual needs (Gaitas & Alves Martins, 2017). In addition, teachers' metacognitive abilities are helpful in developing conducive classroom learning environment which fosters students' learning (Meyers & Feeney, 2016). Through utilizing metacognition, teachers introduced their classrooms as a community and encouraged the students to exchange their thoughts and ideas (Wall & Hall, 2016).

In the views of Nagar (2012), it is the teachers' obligation to manage the educational system. So, teachers of modern-day classrooms should have effective professional skills. McLoughlin and Lee (2010) claimed that one of the major professional skills is creating a classroom learning environment that is conducive to learning. Similarly, several studies suggested that the classroom learning environment and its components play a significant role in students' academic performance (Back, et, al., 2016; Adeyemo, 2012). In order to effectively achieve learning outcomes, Fraser (1981) suggested that a classroom learning environment should include several elements. These elements are personalization, participation, independence, investigation and differentiation. In personalization, teachers allow the students to customize their own learning experiences which are related to their individual needs and based on their personal preferences. Literature demonstrated that in self-directed learning, students are more engaged and feel motivated in the accomplishment of learning objectives (Bonk & Lee, 2017). Alike personalization, students' participation in academic activities is another critical component of the classroom learning environment (Lear, Ansorge & Steckelberg, 2010). Gedera, et al., (2015), argued that active participation of students in classroom activities connects them with their peers and predetermined learning objectives. This sense of belongingness increases the engagement and motivation of students which ultimately results in high achievements of students (Kahu & Nelson, 2018). Moreover, students' independence is also a significant element that contributes to developing a conducive classroom learning environment (Rufii, 2015). Similarly, Magnusson and Zackariasson (2019), claimed that when students experience independence and freedom of choice in their class, they are more likely to take initiative and become in charge of their learning. It also develops a sense of responsibility among students (Rolina, 2014). Besides this, students' investigative attitude also plays a vital role in the learning process and develops a healthy learning environment (Huang et al., 2010). Such type of learning environment emphasizes students' discoveries and exploration of knowledge through inquiry-based learning (Wale & Bishaw, 2020). It helps to provide a deep insight

into knowledge to students (Gholam, 2019). Additionally, several research scholars laid stress on the differentiated learning of students (Pozas, et al., 2023). Cheon, et, al. (2022), stated that a conducive learning environment should be focused on individualized instruction. Likewise, research has shown that a teacher must use differentiated instruction to meet individual needs and manage individual differences among students (Wan, 2016). In light of the above-mentioned fact, teachers can increase student engagement, motivation, and academic performance.

However, research showed that a conducive classroom learning environment is not a single factor in maintaining quality teaching. Along with the conducive learning environment, a teacher requires some strong professional competencies such as the use of metacognitive skills. Numerous researches explained that metacognition refers to the awareness of one's cognition and thinking process (Evans, 2020; Kavitha & Sasipriya, 2020). In the same vein, literature revealed that there are three elements of metacognition that a teacher uses in their classroom teaching, such as; cognitive strategies used, self-regulation, and cognitive self-consciousness (Khurram, et al., 2020).

According to Wagaba (2013), cognitive strategy use refers to the use of particular and effective strategies for learning. As mentioned by Lowe (2010), it also involves, selecting and applying appropriate cognitive strategies for specific situations during teaching and learning. These strategies allow the students to accurately solve their learning problems (Young & Sewell, 2015) and regulate their learning process. Likewise, Crede and Phillips (2011), argued that cognitive strategies optimize the students' knowledge and help in setting academic goals. In the same way, Lemaire (2016) explained that appropriate use of cognitive strategies is the predictor of successful performance of a cognitive task.

Moreover, researchers claimed that teachers' self-regulation is also a key element of teachers' metacognition. Self-regulation refers to an effort that includes organized activities to achieve learning outcomes (Syahmani, 2019). Furthermore, self-regulated learning laid stress on the active participation of learners rather than the passive contribution to learning activities (Sanders et al., 2023). Similarly, Panadero (2017), described that it is a purposeful and proactive form of learning. It also assists in setting and persuasion of learning goals (Cavadel et al., 2016). Besides, researchers stated that self-regulation also helps individuals to monitor predetermined goals by analyzing the components of self-regulation which may include, planning, monitoring and evaluation (Lara et al.,2020; Langdon et al., 2019).

Besides the cognitive strategies used and self-regulation, cognitive self-consciousness is also a critical component of teachers' metacognition. Experts coined that cognitive self-consciousness involves one's awareness and monitoring the personal thoughts (Baumgartner, et, al., 2020). Similarly, Wagaba (2013) advised that cognitive self-consciousness is related to the tracking of teachers' thoughts during the teaching-learning process. The sole purpose of this tracking is to get awareness about one's cognitive process (Avargil et al., 2018). It also improves effort convergence, self-esteem, and self-efficacy of teachers. Similarly, it enables the teachers to effectively complete their tasks and also play a pivotal role in their professional development (Petanova & Stoyanova, 2016).

In the contemporary age, there is a continuous debate among educational researchers about the conducive learning environment and its relationship with teachers' metacognition and the role of teachers in the process of developing such type learning environment (Karlen, 2016). This is also a debatable issue whether teachers should adopt novice and constructivist models of teaching or rely on conventional teaching strategies that promote teachers' authority over the classroom environment.

In the light of literature, it is concluded that teachers who use metacognitive skills are more efficacious in developing a conducive classroom learning environment because they have an awareness and understanding of their teaching processes (Franklin &

Harrington, 2019). This awareness enables teachers to become more responsive in the fulfillment of student needs (Keiler, 2018). They also adjust their instructions according to these needs which leads towards the creation of a student-centered learning environment. Thus, the purpose of this study is to examine the impact of teachers' metacognition on developing a conducive classroom learning environment. In short, the intended targets of the study might be;

1. To investigate the relationship between teachers' metacognition and classroom learning environment.

2. To examine the effect of teachers' metacognition on the classroom learning environment.

3. To identify the difference between teachers' metacognition and classroom learning environment on the base of demographics.

Hypothesis

Ho1: There is no significant relationship between teachers' metacognition and classroom learning environment.

Ho2: There is no significant difference between teachers' metacognition and classroom learning environment across gender.

Ho3: There is no significant difference between teachers' metacognition and classroom learning environment based on disciplines.

Ho4: There is no significant difference between teachers' metacognition and classroom learning environment based on teaching level.

Ho5: There is no significant effect of teachers' metacognition on the classroom learning environment.

Material and Methods

The present study is descriptive and conducted through survey technique. This study was conducted in the 825 public sector colleges of the Punjab Province and all the college teachers who are providing general education are part of the population. Keeping in the view aforementioned facts, it is impractical for researcher to approach the entire population. So, the researcher randomly selected the 12 districts and administered the research instruments. Two instruments were administered for the survey in randomly selected colleges. Teachers gave their opinions about the independent and dependent variables of research on a 5-point Likert scale questionnaire. The independent and dependent variables were measured through PTMAQ (Khurram, et, al., 2020) and ICEQ (Fraser, 1981) respectively. After the data collection process researcher analyzed and tabulated data by applying various statistical procedures using SPSS 20.

Data Analysis

Table 1
Frequency of respondents

Variables		College Teachers	N
Gender	Male	207	526
	Female	319	
Discipline	Science	265	526
	Social Science	261	
Teaching Level	Intermediate	271	526
	ADP/BSc	70	
	BS (Hons)/ 16 Year Education	69	
	Intermediate, ADP/BSc, and BS (Hons)/16 Year Education	116	

Table 2
Normality analysis

Variable	N	Mean	Skewness	Kurtosis
Teacher Metacognition	526	4.16	0.082	0.241
Classroom Learning Environment	526	3.82	0.469	0.768

Hypothesis

Table 3
Correlation between teachers' metacognition and classroom learning environment

	N	Mean	SD	r	*p*
TM		4.16	.41		
L.E	526	3.82	.37	0.576**	0.000

**. Correlation is significant at the 0.01 level (2-tailed). TM=Teachers' metacognition and CLE=Classroom learning environment

Table 3 revealed that *p* value for the test is 0.000 (0.00<0.01) which shows the test is statistically significance. The mean score for teachers' metacognition is 4.16 while 3.82 for classroom learning environment. The value of SD in the above table is 0.41 for Teachers' Metacognition and 0.37 for Learning Environment. The value of Cronbach alpha is 0.576 which shows the moderate relationship between teachers' metacognition and classroom learning environment. Thus, the null hypothesis, "there is no significant relationship between teachers' metacognition and classroom learning environment" is not accepted.

Table 4
Difference between teachers' metacognition and classroom learning environment across gender

Variable	Gender	N	Mean	T	Sig
TM	Male	207	4.164	-0.115	0.90
	Female	319	4.169		
CLE	Male	207	3.78	-2.018	0.044
	Female	319	3.84		

The mean difference is significant at the 0.05 level. TM=Teachers' Metacognition, CLE=Classroom Learning Environment

Table 4 revealed the results of gender-based differences between teachers' metacognition and classroom learning environment. The table shows that there is no significant difference (*Sig=0.90*>0.05) in teachers' metacognition of male and female teachers. Moreover, it is inferred from the results that a significant difference exists between the classroom learning environment of male and female teachers (*Sig=0.044*<0.05).

Furthermore, the mean score for male teachers ($\bar{X}$=3.78) in the classroom learning environment is less than the mean score ($\bar{X}$=3.84) of female teachers which shows the classroom learning environment of female teachers is more conducive than male teachers. So, the null hypothesis, "there is no significant difference between teachers' metacognition and classroom learning environment across gender" is accepted for teachers' metacognition and not accepted for classroom learning environment.

Table 5
Difference between teachers' metacognition and classroom learning environment based on disciplines

Variable	Discipline	N	Mean	t	Sig
TM	Science	265	4.17	0.415	0.679
	S. Science	261	4.15		
CLE	Science	265	3.87	3.43	0.001
	S. Science	261	3.76		

The mean difference is significant at the 0.05 level. TM=Teachers' metacognition, CLE=Classroom learning   environment

Table 5 statistically describes the difference between teachers' metacognition and classroom learning environment on the base of discipline (science teachers and social science teachers). It is observed in the statistics that there is no significant difference (*Sig=0.679*<0.05) exists in the metacognitive abilities of teachers who taught science subjects and the teachers who taught social science subjects in the colleges. Moreover, it reflects the significant difference (*Sig=0.001*<0.05) between the classroom learning environment of science teachers and social science teachers. The mean score ($\bar{X}$=3.78) of social science teachers is less than the mean score ($\bar{X}$=3.87) of science teachers which indicates that science teachers experienced a more conducive classroom learning environment than social science teachers. Thus, the null hypothesis, "there is no significant difference between teachers' metacognition and classroom learning environment based on disciplines" is not accepted for teachers' metacognition but accepted for classroom learning environment.

Table 6
Difference between teachers' metacognition and classroom   learning environment based on teaching level

		Sum of Squares	Df	Mean Square	F	Sig.
TM	Between Groups	.173	3	.058	.328	.805
	Within Groups	91.697	522	.176		
	Total	91.870	525			
Learning Environment	Between Groups	1.660	3	.553	4.089	.007
	Within Groups	70.642	522	.135		
	Total	72.302	525			

The mean difference is significant at the 0.05 level. TM=Teachers' metacognition

Table 6 revealed the results of statistical procedures adopted to identify the significant difference between teachers' metacognition and classroom learning environment based on different teaching levels. It was concluded that there is no significant difference exists in the metacognitive abilities of teachers of different teaching levels (F=0.328 and *p*=0.805). Moreover, a significant difference exists in the classroom learning environment of teachers of different teaching levels (F=4.089 and *p*=0.007). So, the null hypothesis, "there is no significant difference between teachers' metacognition and classroom learning environment based on teaching level" was not accepted for teachers' metacognition and accepted for classroom learning environment. It further proceeded

through post hoc test to determine which teaching level has a significant difference in the classroom learning environment.

Table 7
Post Hoc results of Difference between teachers' metacognition and classroom learning environment based on teaching level

	Teaching Level (I-J)		Mean Difference (I-J)	SE	Sig.	CI
Classroom Learning Environment	Intermediate	ADP/BSc	.04750	.04932	.771	-.079, .174
		BS (Hons)/ 16 Year Education	-.01581	.04961	.989	-.143, .112
		Intermediate, ADP/BSc, and BS (Hons)/16 Year Education	.13412*	.04082	.006	.028, .239
	ADP/BSc	Intermediate	-.04750	.04932	.771	-.174, .079
		BS (Hons)/ 16 Year Education	-.06330	.06241	.741	-.224, .097
		Intermediate, ADP/BSc, and BS (Hons)/16 Year Education	.08662	.05568	.405	-.056, .230
	BS (Hons)/ 16 Year Education	Intermediate	.01581	.04961	.989	-.112, .143
		ADP/BSc	.06330	.06241	.741	-.097, .224
		Intermediate, ADP/BSc, and BS (Hons)/16 Year Education	.14993*	.05593	.038	.005, .294
	Intermediate, ADP/BSc, and BS (Hons)/16 Year Education	Intermediate	-.13412*	.04082	.006	-.239, -.028
		ADP/BSc	-.08662	.05568	.405	-.230, 0.056
		BS (Hons)/ 16 Year Education	-.14993*	.05593	.038	-.294, -.005

The mean difference is significant at the 0.05 level

Table 7 indicates the results of the post hoc test which explained that teachers who teach only intermediate classes have significant differences with teachers who teach at all the teaching levels (mean difference=0.134, *p*=.006 and CI=0.28, 0.239). Similarly, the above table shows that teachers who teach to only BS (Hons)/16 Year Education level have significant differences with teachers who teach at all the teaching levels (mean difference=0.149, *p*=.038 and CI=0.005, 0.294).

Table 8
Effect of teachers' metacognition on the classroom learning environment

Variables	N	B	t-value	R Square	Sig	SE
TM → CLE	526	0.576	16.11	0.331	0.000	0.30

Note: Difference is significant at the 0.01 level (2-tailed). TM=Teachers' Metacognition, CLE= Classroom Learning Environment, and N=Number of respondents

Table 8 describes the effect of teachers' metacognition on the classroom learning environment through linear regression. The value of R square is 0.331 which explains the variance in the criterion. The β, t-value and SE are 0.576, 16.11 and 0.30 respectively, while the value of significance is 0.000. It is observed in the results that teachers' metacognition has a significant effect on the classroom learning environment. It is further explained that the one unit of teachers' metacognition increases the 33 units of the classroom learning environment. Thus, the null hypothesis, "there is no significant effect of teachers' metacognition on classroom learning environment" is not accepted, while the alternative hypothesis is accepted.

Findings

1. The results of the study at hand indicate a significant relationship between teachers' metacognition and classroom learning environment.

2. The results of this study reveal that there is no significant difference between the metacognitive abilities of male and female teachers. Besides, these results also reflect the significant difference in the classroom learning environment of those male and female teachers.

3. It is inferred from the results of the study that science and social science teachers have no significant difference in their metacognitive abilities, while both have a significant difference in the classroom learning environment.

4. The result of the study shows that there is no significant difference exist among the metacognitive abilities of teachers at different teaching level, while a significant difference exists in the classroom learning environment for those teachers.

5. The results of the present study reflect a significant effect of teachers' metacognition on the classroom learning environment.

Discussion

This study reflects the well-established relationship between teachers' metacognition and classroom learning environment. This finding inclined with the previous research that claimed the relationship between teachers' metacognition and classroom learning environment (Thienngam, et al., 2020; Thomas, 2013). Similarly, Brown (2016), mentioned that teachers' metacognitive abilities are important contributors in developing classroom learning environments. In the same way, Schofield (2012), argued that teachers' metacognitive abilities positively influenced the teaching-learning process as well as the classroom learning environment. Moreover, Sahin (2015), explained that a classroom learning environment that is metacognitively oriented enhances the student's critical thinking skills which plays a pivotal role in academic success. Furthermore, Etkin (2018), described that a self-regulated teacher may effectively manage their classroom situations.

The study at hand portrays that teachers do not have significant differences in their metacognitive abilities based on gender, discipline and teaching level. In the same vein, Chantharanuwong, et al., (2012), describe that male and female teachers do not have any difference in their metacognitive abilities. In contrast, previous research also revealed that female teachers have better metacognitive abilities than male teachers (Akin, 2016; Ciascai & Lavinia, 2011). Moreover, the results of this study indicate that teachers have significant differences in classroom learning environment on the base of various factors such as gender, discipline and teaching level. Likewise, Moyer (2003), indicates that male and female teachers have different classroom learning environments. The classroom learning environment of female teachers is more collaborative while male teachers prefer a competitive classroom learning environment. Similarly, another study describes that male and female science teachers also have different classroom learning environments (Anita et al., 2014). In contrast, Amponsah (2013), mentioned that there is no significant difference in male and female teachers' classroom learning environment. Moreover, the results of this study reflect that teachers' metacognition positively influenced his/her classroom learning environment. In the inclination of this finding, the study of Nikpour et al., (2011), also emphasized that teachers' metacognition is an important element in developing a conducive classroom learning environment.

Conclusion

The findings of this research provide evidence that teachers' metacognition is positively correlated with the classroom learning environment. Moreover, this relationship suggests that investing in teachers' metacognitive abilities helps in the attainment of learning outcomes within the classroom. Therefore, continuous efforts to develop teachers' metacognitive skills promote innovation and effective teaching practices which helps them to create a more nurturing and inclusive classroom learning environment. It is also beneficial for both teachers and students.

This study presents notable evidence that there is no statistically significant difference exists between the metacognitive abilities of male and female teachers. Additionally, the study at hand also highlights the statistical difference between the classroom learning environment of male and female teachers. This difference may involve various factors such as teaching styles, teachers' way of communication, management strategies, and interpersonal dynamics. The inferred results indicate the importance of developing a conducive classroom learning environment. Moreover, these findings highlight the need to introduce dynamic approaches and teachers' professional development at different levels to develop a more supportive and inclusive classroom learning environment.

The findings of this study revealed that there exists no significant difference between the metacognitive abilities of teachers who belong to different disciplines, such as sciences and social sciences. However, results also mentioned that a statistically significant difference exists between the classroom learning environment of science teachers and social science teachers. Thus, this finding suggests that teachers' cognitive approaches may be aligned but their classroom environment may diverge by a potential influence of their discipline or subjects. Moreover, these results give insight to policymakers to introduce an interdisciplinary approach that fosters collaborative efforts between science and social science teachers. This exchange develops more holistic and inclusive teaching approaches among teachers, promote effective learning experiences for students and bridges gaps between diverse classroom environment.

The findings of the study at hand reflect no significant difference in the metacognitive abilities of teachers at different teaching levels, while there is a notable statistical difference in the classroom learning environment. This suggests a consistent need to improve teachers' metacognitive abilities of teachers at different teaching levels. Additionally, targeted interventions should be initiated to improve classroom learning environments which ultimately influence the learning process.

The results of this study indicate that teachers' metacognition has a significant impact on the classroom learning environment. Moreover, it suggests integrating the training of metacognitive abilities at various teachers' professional development programs which offer support to develop an inclusive classroom learning environment.

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