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The interplay of socio-demographic variables and teacher effectiveness in higher education

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Abstract
As we step into a new millennium, witnessing global transformations in every facet of life, education undergoes substantial reforms, with teachers playing a pivotal role in this evolving landscape. This study explores how socio-demographic factors affect teacher effectiveness in higher education. A survey was carried out with 398 teachers from management and technical colleges using a multilevel sample approach. The findings reveal gender disparities, with age as a significant factor influencing teacher effectiveness. Teachers aged 35-40 exhibited the highest effectiveness. Experience proved to be a crucial determinant, with the teachers having 10-15 years of experience demonstrating the highest level of effectiveness. These findings highlight the need for turnaround initiatives to be implemented right away. To enhance teacher effectiveness, it is recommended to encourage female teachers, organize regular in-service training sessions focusing on work-life balance and self-management, and provide challenging assignments with innovative pedagogy and ICT-enabled tools for teachers with 20 years of experience and above.

Keywords: Teacher effectiveness, socio-demographic variables, higher education, management & technical teachers

Introduction
Every aspect of life is changing throughout the world as we enter a new millennium, and education is no exception. Teachers have a major role in the significant and hopeful educational reforms that societies are enacting (Devlin, 2007; Cardoso *et al*., 2015; Milienos *et al*., 2021) [7, 5, 15]. In any educational institution, the teacher is the single most crucial element that plays a major role in ensuring that the educational process is implemented successfully (Ding & Sherman, 2006; Devlin & Samarawickrema, 2010) [9, 8]. Gandhi (1948) [24] said that "No country can make any progress without good teachers". Teachers are the linchpin of educational institutions, surpassing even advanced structures and policies. Their understanding of student psychology fosters fundamental skills, work habits, and values (Sharma, 2010; Burroughs et al., 2019) [22, 4] Effective teachers, driven by achievement and commitment, bring energy, enthusiasm, and patience to well-prepared lessons, providing students a platform for self-development. Various factors contribute to the effectiveness of a teacher. They don't perform the role of teachers only for the students but they are their guides, mentors, facilitators, admirers, coaches, and so forth. These days, students rate a teacher effective who can make connections with the student, who tries to understand his/her psychology, who understands the world from the student's perspective and subsequently takes the student to the ocean of knowledge and widens his/her horizons (Mastrokoukou S. *et al*., 2022) [14]. In simple words, teacher effectiveness stems from a combination of knowledge, skills, and personal characteristics which are correlated with effectiveness such as good knowledge of the subject matter, potential to organize learning materials, capacity to disseminate knowledge to the students successfully, and to deal with diverse classroom situations. It has been rightly said that there is no single road to effective and teaching.There may be many roads, highways, byways and narrow lanes, easy delightful paths and rough testing turns to achieve effectiveness in the classroom for the fulfilment of teaching goals (Mastrokoukou S. *et al*., 2022) [14]

Review of literature
Teacher effectiveness is a more inclusive and comprehensive construct used in modern educational theory. In the domain of L2 education, it had been reported that teachers who were more self-regulated could better manifest teaching effectiveness Toussi *et al*. (2011) [25].

Cruickshank (1990) [6] summarized that teacher effectiveness was depended upon his/her personality traits, knowledge, teaching methodologies, classroom management skills, teacher expectations, and pupils' responses based on ten studies (Rosenshine & Frust, 1971; Dragana et al. 1997; Gage, 1972; Borich et al., 1977; Borich 1996; Emmer, 1971; Shah, 1995; Rao, 1987) [20, 10, 12, 2, 3, 11, 21, 18]. But Rao (1995) [17] gave more importance to creativity and the inter-personal relationship of teachers while studying teacher effectiveness and found a significant relationship between them. Also, Renaud and Murray (1996) [19] investigated the extent to which personality traits associated with teaching effectiveness changed with aging, mediating the relationship between age and teaching and results confirmed that teaching effectiveness was inversely related to age and was correlated with several personality traits. Pandey and Maikhuri (1999) [16] explore the attitude of effective and ineffective teachers towards the teaching profession and findings revealed that there was no significant difference between effective teachers having high or low experience in terms of their attitude towards their profession; also, high experienced effective teachers' attitude was positive towards teaching profession than low experienced ineffective teachers. Pachaiyappan & Raj (2014) also suggested that teacher effectiveness is different among the school teachers as far as locale, stream, secondary and higher secondary level, teaching experience, and type of school management were concerned. Thakur (2017) [23] indicated that female secondary school teachers were more effective because they were empathetic and better listeners (Malik and Kapoor, 2014) [13]. Furthermore, while examining the impact of emotional intelligence on teacher effectiveness, Kauts & Chechi (2014) confirmed that emotional intelligence and work experience played a significant role in measuring teacher effectiveness in their research with a sample of 739 school teachers of Punjab. Singh, (1987) & Gupta, (1988) also supported that teacher effectiveness is related to personality, attitude, intelligence, adjustment, experience, and educational qualification of the teacher.

On one hand, it was documented that experience had a vital impact on teacher effectiveness in the early years of career but after twenty years, no further gains to experience can be corroborated. On the other hand, in Ling's study teacher effectiveness was investigated in implementing extra-curricular activities and results supported that experienced teachers were far more effective in implementing extra-curricular activities than the teachers with less teaching experience. Similar results were reported by Kane *et al*. 2006; Rivkin *et al*. 2005 & Decker, *et al*. 2004 where it was summarized that experienced teachers were more effective in handling different types of teacher responsibilities.

However, various studies reported no significant relationship between teacher experience and teacher effectiveness. Furthermore, Teacher effectiveness is closely associated with socio-demographic variables like age, gender, marital status, experience, designation, locality, etc. (Pandey & Maikhuri, 1999; Sharma, 2010; Thakur, 2017) [16, 22, 23]. A research vacuum was identified by the review of the literature, indicating that not many studies have examined the effectiveness of teachers in higher education in Punjab and Chandigarh. Furthermore, there hasn't been much research done on the relationship between socio-demographic factors and teacher effectiveness. Therefore, the framed objectives are:

1. To determine the level of teacher effectiveness in AICTE (All India Council for Technical Education) approved colleges of different regions of Punjab & Chandigarh.
2. To explore the association of socio-demographic variables with Teacher Effectiveness.

Hypothesis

H_{01}: There is no association of age with teacher effectiveness.

H_{02}: There is no association of gender with teacher effectiveness.

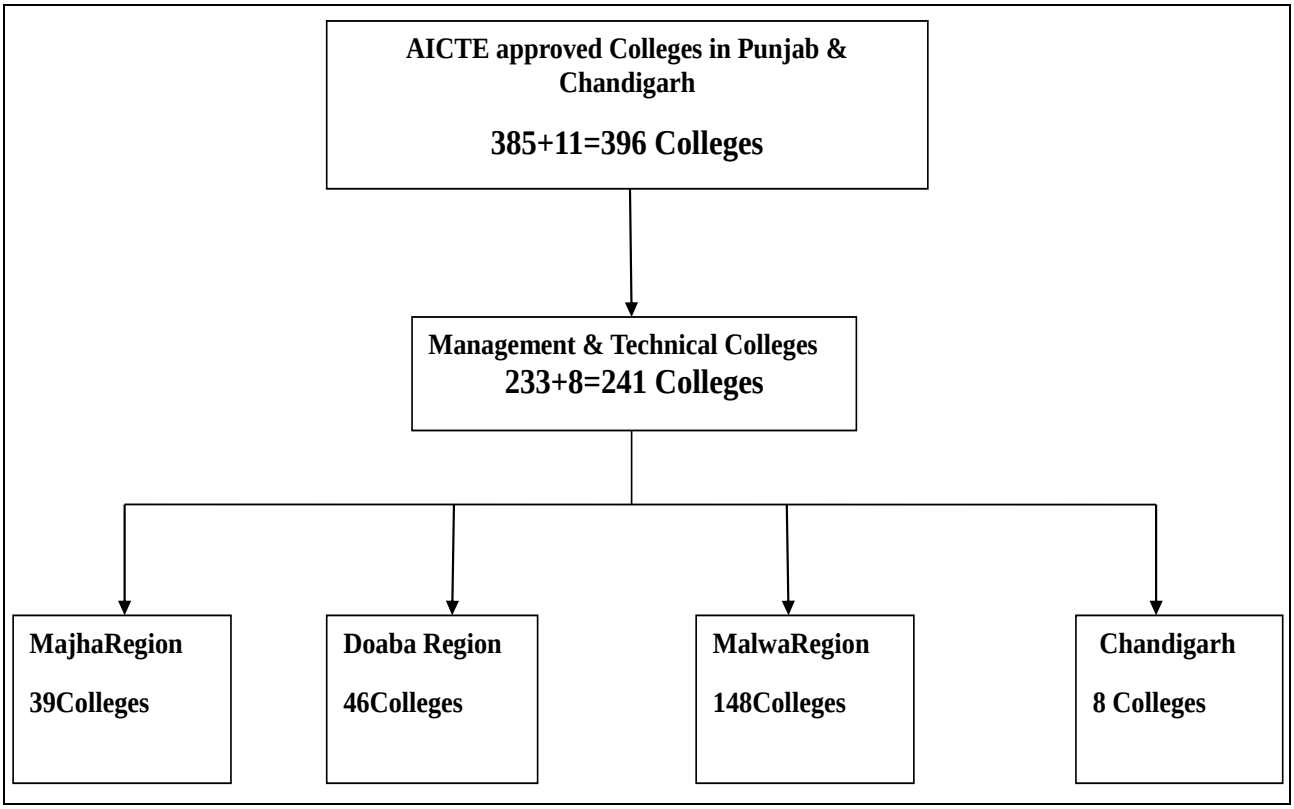
H_{03}: There is no association of marital status with teacher effectiveness.

H_{04}: There is no association of years of experience with teacher effectiveness.

H_{05}: There is no association of designation with teacher effectiveness.

Study Methodology

The present study is descriptive and empirical. The study relies on both primary and secondary data. Primary data has been collected through questionnaires and secondary data has been collected through research journals, magazines, reports, and website of the AICTE and other related websites. It is confined to cover teacher effectiveness from various management & technical colleges in Punjab & Chandigarh. Punjab has been divided into three regions i.e. Majha region, the Doaba region, and the Malwa region, fourth region was Chandigarh. To collect the requisite sample for the present study, a stratified random sampling technique in the combination of random sampling technique was used. The sample of the study comprised of teachers selected from different AICTE approved technical and management colleges of three regions of Punjab and Chandigarh. The data has been collected from 398 management and technical college teachers of Punjab comprising of age, gender, marital status, qualification, experience, and designation of teachers as socio- personal characteristics.



For assessing the teacher effectiveness of college teachers, the Teacher Effectiveness Scale constructed and standardized by Mishra (1999) was used. To arrive at the pertinent analysis, collected data is analyzed using SPSS 17.0 package. Tools used to test the hypothesis for analysis were Mann Whitney U test, and Kruskal Wallis Test.

Data Analysis & Interpretation

Table 1: Classification of the teacher effectiveness scale (TES) scores into categories by Sujata Mishra (1991)

Category	Range of Raw Scores	Level of effectiveness
A	33-69	Low Effective
B	70-125	Average Effective
C	126-165	High Effective

The table above defined the range of raw scores of the questionnaire and further, the level of teacher effectiveness. In our sample, it was found that teachers in all three regions of Punjab (Majha, Doaba, and Malwa) and Union Territory of Chandigarh had raw scores lying between 70-125 which clarifies that level of effectiveness belonged to Category B and teachers were average effective. Further, to examine the association of demographic variables with teacher effectiveness, two non-parametric tests; the Mann Whitney U test and Kruskal Wallis test was applied to ascertain the level of significance and derive the relevant conclusions.

H_{01}: There is no association of age with teacher effectiveness

As a demographic variable- age has more than two categories, so the Kruskal Wallis test had been used to analyze the association between age and teacher effectiveness. Descriptive statistics of age presents the number of respondents in each category of age and their respective mean ranks as shown in Table 1.

Table 2: Descriptive statistics and Kruskal Wallis test for association between age and teacher effectiveness

Age	N	Mean Rank
23-30	49	149.82
30-35	95	174.26
35-40	117	259.52
40-45	109	251.70
45 & above	28	229.50
Total	398	

Table 3: Kruskal Wallis test statistics for the association between age and teacher effectiveness

Variable	TE
Chi-Square	51.218
Df	4
Asymp. Sig.	.000

a) Kruskal Wallis Test
b) Grouping Variable: Age

From the table 3 above, we could say that we found strong evidence for the association of age with teacher effectiveness as the p-value is less than the alpha value with a chi-square value as 51.218. Further, from the Table, we can also say that the mean rank of teachers lying in the age group of 35-40 years (259.52) is highest and they are most effective.

Then teachers lying in the age group of 40-45 years and 45 & above with mean rank 251.70 and 229.50 respectively found to be next effective. Whereas teachers lying in the age group of 23-30 years were having the lowest mean rank (149.82) and were found to be the least effective at 5% significance level, so, the null hypothesis is not rejected. Hence, we conclude that null hypothesis. H_{01}: There is no association of age with teacher effectiveness is stands rejected at 5% significance level. It can be inferred that new teachers are ineffective because of inexperience, lack of exposure, etc. and as a teacher grows in age and experience,

level of effectiveness differs, maybe because of new responsibilities, increasing family responsibilities, health issues, monotony, added responsibilities with increasing age, etc.

H_{02}: There is no association of gender with teacher effectiveness

To examine the association of gender with teacher effectiveness, Mann Whitney U test had been used and the results of descriptive statistics revealed that male teachers (219.81) had a high mean rank as compared to their counterparts. The mean rank value of female teachers came out to be 177.49 as shown in the Table 4.

Table 4: Descriptive statistics and Mann Whitney U test for association between gender and teacher effectiveness

	Gender	N	Mean Rank	Sum of Ranks
TE	Male	207	219.81	45500.50
	female	191	177.49	33900.50
	Total	398		

Table 5: Mann Whitney U test statistics for the association between gender and teacher effectiveness

Variable	TE
Mann-Whitney U	15564.500
Wilcoxon W	33900.500
Z	-3.716
Asymp. Sig. (2-tailed)	.000

a. Grouping Variable: gender

From the table 5 above, we could confidently say that the null hypothesis H_{02}: There is no association of gender with teacher effectiveness stands rejected as we had strong evidence that there is an association between male and female teachers with teacher effectiveness at 5% significance level within the population of our sample. Above mentioned statistics showed that male teachers had a better association with teacher effectiveness as compared to their female teachers.

It may be because females have more household responsibilities such as preparing meals, taking care of children, family members, etc. because of which their overall effectiveness as the teacher gets affected. Probably, the male members are the bread earners for their families hence they showed higher commitment to their jobs. Since they did not engage in daily household chores, they might get extra time to share extra knowledge in the classroom.

H_{03}: There is no association of marital status with teacher effectiveness

To examine the association of marital status with teacher effectiveness, Mann Whitney U test has been used and results of descriptive statistics revealed that married teachers (221.21) had a high mean rank as compared to the rank value of unmarried teachers (187.330) as shown in the Table 6:

Table 6: Mann Whitney U test for association between marital status and teacher effectiveness

	Status	N	Mean Rank	Sum of Ranks
TE	Married	255	221.21	31633.00
	Unmarried	143	187.33	47768.00
	Total	398		

Table 7: Test Statistics

Variable	TE
Mann-Whitney U	15128.000
Wilcoxon W	47768.000
Z	-2.857
Asymp. Sig. (2-tailed)	.004
a. Grouping Variable: status	

Additionally, from the Table 7 above, it was that Mann Whitney U value is 15128.000 and its significance value came out to be .004. Hence, we conclude that null hypothesis H_{03}: There is no association of marital status with teacher effectiveness stands rejected as p-value is less than alpha value.

H_{04}: There is no association of years of experience with teacher effectiveness.

As a demographic variable- experience has more than two categories, so the Kruskal Wallis test had been used to analyse the association between experience and teacher effectiveness. Descriptive statistics of experience presents the number of respondents in each category of experience and their respective mean ranks as shown in Table 8:

Table 8: Descriptive statistics and Kruskal Wallis test for association between years of experience and teacher effectiveness

	Experience	N	Mean Rank
TE	0-5	75	150.33
	5-10	213	156.01
	10-15	42	296.80
	15-20	48	183.64
	20 and above	20	179.31
	Total	398	

Table 9: Kruskal Wallis test for association between years of experience and teacher effectiveness

	TE
Chi-Square	71.399
Df	4
Asymp. Sig.	.000
a. Kruskal Wallis Test	
b. Grouping Variable: Experience	

From the table 9 above, we found strong evidence for the association of experience with teacher effectiveness as the p-value is less than the alpha value with a chi-square value as 71.399. Further, from Table, we can also say that the mean rank of teachers with an experience of 10-15 years exhibited the highest mean rank (296.80) and they were found to be the most effective teachers. Further, teachers with experience of 15-20 years, 20 & above years, and 5-10 years showed mean rank 183.64, 179.31, and 156.33 respectively. Teachers with experience of 0-5 years were found to be least effective as the mean rank came out to be 150.33. Hence, we conclude that null hypothesis hence.

H_{04}: There is no association of years of experience with teacher effectiveness stands rejected

It can be inferred that new teachers are ineffective because of lack of experience, exposure, teaching methodologies, etc. and a teacher with experience of 15- 20 years and above has rich experience of classroom handling, student psychology, a strong command of concepts, adequate teaching methods, etc. that makes him an effective teacher

in the classroom. Also, as a teacher grows in age and experience, the level of effectiveness differs, may be because of, increasing family responsibilities, health issues, monotony, added responsibilities with increasing age, etc. It may be the possibility that guest lecturers are brand new to the profession and just focus on concept clarity and the other hand, professors bear other administrative responsibilities and are more indulged in research work that eats up most of their time and energy, hence, they are less effective in the classroom. Furthermore, lecturers and associate professors have experience with them and probably less administrative and research work that provides an opportunity to make the best use of their energy and knowledge in the classrooms where students are highly benefitted with their enriched lectures.

H_{05}: There is no association of designation with teacher effectiveness

Kruskal Wallis test was applied to analyse the association between designation and teacher effectiveness. Descriptive statistics of designation presents the number of respondents in each category of designation and their respective mean ranks as shown in Table 10.

Table 10: Descriptive statistics and Kruskal Wallis test for association between designation and teacher effectiveness

	Designation	N	Mean Rank
TE	Professors	23	166.43
	Associate Professor	76	199.97
	Assistant Professor/Lecturer	267	308.11
	Guest Lecturer	32	152.26
	Total	398	

Table 11: Descriptive statistics and Kruskal Wallis test for association between designation and teacher effectiveness

Variable	TE
Chi-Square	39.738
Df	3
Asymp. Sig.	.000
a. Kruskal Wallis Test	
b. Grouping Variable: designation	

From the table 11 above, we found strong evidence for the association of designation with teacher effectiveness as the p-value is less than the alpha value with a chi-square value as 39.738. Further, from Table 10, we can also say that the mean rank of teachers working as assistant professors/lecturers was 308.11 and was highest in the table which shows that they were most effective. Further, teachers working as an associate professor were having a mean rank as 199.97 and professors as 166.43. It was found that guest lecturers were least effective as the mean rank came out to be 152.26. Hence, we conclude that null hypothesis.

H_{05}: There is no association of designation with teacher effectiveness stand rejected

Discussion, limitations and recommendations

The findings of the study confirmed that teachers of Management & Technical colleges of three regions of Punjab and Union Territory of Chandigarh had average effectiveness in their classrooms. When age was examined, it was found that there is a significant association of age with teacher effectiveness. Teachers lying in the age group of 35-40 years were found to be most effective whereas teachers lying in the age group of 40-45 years and 45 & above were found to be next effective. But teachers lying in the age group of 23-30 years were found to be least effective. These findings are supported by the study of Amadi, E.C. & Allagoa, I.C. (2017) [1] in which they showed that age, educational qualification, and years of teaching experience had a significant influence on teachers' classroom management effectiveness. Chowdhary (2015) remarked a significant positive relationship between job satisfaction and teacher effectiveness of secondary school teachers in terms of their gender, age, and experience. Also, it was found that the age of teachers has a significant impact on teacher effectiveness.

In the case of gender, it was found that there is a significant association of gender with teacher effectiveness. But, findings also indicated that male teachers had a better association with teacher effectiveness as compared to their counterparts. These findings were supported by a study by Roy & Halder, 2018a; Kaur, 2018 where teacher effectiveness was examined and researchers found that male teachers were more effective than female teachers. Similar findings were mentioned in many other pieces of research researched three performance pay programs in North Carolina and declared the existence of gender difference, where male teachers' value-added remain flat before and after the introduction of performance pay but the value-added of female teachers declines.

There is a significant association of marital status with teacher effectiveness. Further, we conclude married teachers were better than unmarried teachers as far as teacher effectiveness is concerned. These findings were supported by Tyagi, 2013; Islahi & Nasreen, 2013; Agarwal 2003; Rajammal & Muthumanickam, 2012 where a significant impact of marital status was found on teacher effectiveness. When the experience was examined, we found a significant association of experience with teacher effectiveness. It was further observed that teachers with experience of 10-15 years exhibited the highest mean rank and were found to be most effective. Further, teachers with experience of 0-5 years were found to be least effective. The study presented statistical evidence of an association of years of experience with teacher effectiveness. It was supported by Leigh (2010) who believed that experience had a vital impact in the early years of a teacher's career but beyond twenty years, there appeared to be no further gains to experience. Podolsky et al. (2019) concluded that teachers can support student learning better as they gained experience and that gains from experience can continue well into the second and, often third decades of their career but after that additional experience has no benefit for student achievement. Furthermore, Various researches were on average, new teachers were found to be less effective as compared to the teachers with experience. The analysis also demonstrates that designation has a significant association with teacher effectiveness. Further, assistant professors/lecturers were found to be most effective and guest lecturers were least effective based on mean rank. The findings also conveyed the association of designation with teacher effectiveness and it corroborated the study of Roy & Halder (2018), where, it was revealed that in comparison to the para & contractual teachers, the permanent assistant teachers were found better in teaching effectiveness. Arain *et al*. (2014) mentioned that various factors affect teacher effectiveness and professional dignity (grade, salary, etc.) was among them.

In light of the findings of the present study, we suggest that colleges must embrace an open climate in colleges, enhance teacher's activities positively and create a sense of belongingness among them which not only improves their performance but also provides a strong foundation to support new initiatives. Regular in-service training sessions should be organized that provide adequate information on work-life balance, self-management, and hence effectiveness in the classrooms. Colleges should also encourage female teachers and provide adequate information on work-life balance, self-management, and hence effectiveness in the classrooms. Mirroring techniques may be followed which provide practical implications for teachers as an effective teaching tool to build teacher-pupil rapport. Also, yearly performance appraisal systems should be done. The teachers should be provided feedback sessions to guide them in bringing improvements wherever needed.

As far as limitations are concerned, the personal bias of the respondents might have crept in while responding the questionnaire. An extensive literature review was carried out however limitations in interpreting the findings due to differences in understanding of the researcher may exist. The information provided by the teachers was purely based on their perception only.

The study has been confined to management & technical colleges. Generalizations have been made based on the results so obtained and hence may not be appropriate for the whole population of college teachers.

Conclusion

From the present study, it can be concluded that teachers in Punjab & Chandigarh were average effective in their classrooms. This study serves this purpose of elucidating the current scenario of teacher effectiveness so, Government, college managements, and institutional heads can use these findings to design and implement appropriate strategies for improved academic conditions in the state. Moreover, to refine and further elaborate the novel findings of the study it can be carried out in the future by the researchers. Future studies should extend to other colleges providing degrees in arts, commerce, etc. The sample included only the teachers' perspectives on evaluation. Responses from Principals and students could be taken for future studies. The study had been undertaken only in the Punjab state of the country. Researchers should focus on similar investigations for other states or the country as a whole.

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