Educational Administration: Theory and Practice
2024,30(1), 4732 - 4742
ISSN:2148-2403
https://kuey.net/

Research Article

A Study On Relationship Of Teacher Effectiveness With Meta Cognitive Ability, Teaching Style And Digital Competence Among Prospective Teachers

Sharanjit Kaur[1*], Dr Mohd Arif Husain[2], Dr Satnam Kaur[3]

[1*]Research Scholar, Department of Education, CT University, Ludhiana
[2]Professor, Department of Education, CT University, Ludhiana
[3]Associate Professor, Khalsa College of Education, Ranjit Avenue, Amritsar

Citation: Sharanjit Kaur, et.al (2024), A Study On Relationship Of Teacher Effectiveness With Meta Cognitive Ability, Teaching Style And Digital Competence Among Prospective Teachers, Educational *Administration: Theory and Practice*, *30*(1), 4732 - 4742
Doi: 10.53555/kuey.v30i1.8367

ARTICLE INFO

ABSTRACT

This study explores the relationship between teacher effectiveness and meta cognitive ability, teaching style, and digital competence among prospective teachers. The study aims to assess whether these factors significantly contribute to teacher effectiveness and to analyze differences in teacher effectiveness across demographic variables such as gender, location, and academic background. The sample consists of 600 prospective teachers and were randomly selected from different self-financed educational colleges affiliated to Guru Nanak Dev University, Amritsar, Panjab University, Chandigarh and Punjabi University, Patiala. The data was collected by using standardized scale of Teacher Effectiveness Scale (Suraiya & Shakir, 2023), Meta-cognitive Ability skills Scale (Gupta & Suman, 2017), Teaching Style Scale (Sharma & Saran, 2017), Digital Competence Scale (Srivastava & Dangwal, 2021). The data obtained was analysed statistically with the help of Mean, SD, t-ratio and 'r' and used to arrive at the following conclusions: Findings revealed a significant difference in teacher effectiveness scores between male and female prospective teachers, as well as between those from rural and urban areas. However, no significant difference was found based on the academic background (arts versus science) of the prospective teachers. Regarding metacognitive ability, a significant difference emerged between male and female prospective teachers, as well as between those from arts and science backgrounds; however, no significant difference was found between rural and urban prospective teachers. Additionally, a significant relationship was observed between teacher effectiveness and digital competence, indicating that higher digital competence positively correlates with improved teaching effectiveness. Moderate correlations were also found between teacher effectiveness and both metacognitive ability and teaching style. These findings underscore the importance of digital competence in enhancing teacher effectiveness and suggest that targeted training in metacognitive skills and teaching style may further support prospective teachers' development.

Keywords: Teacher Effectiveness, Meta Cognitive Ability, Teaching Style, Digital competence, Prospective Teachers

Introduction

Teacher effectiveness has become a critical focus in educational research, given its substantial influence on student learning outcomes and overall classroom success (Darling-Hammond, 2000). As educational landscapes evolve, especially with increasing digital integration, understanding the skills and attributes that contribute to teacher effectiveness is essential. Key among these attributes are metacognitive ability, teaching style, and digital competence. Metacognitive ability—the awareness and regulation of one's own learning processes—enables teachers to reflect on their instructional strategies and adapt to diverse classroom dynamics (Flavell, 1979). Effective teaching style, marked by flexibility, empathy, and clarity, is also essential, as it shapes how knowledge is conveyed and received by students (Stronge, 2018). Furthermore, digital competence has become increasingly important in the 21st century, as teachers are expected to integrate technology into teaching to enhance engagement and facilitate learning (Redecker, 2017). This study investigates the relationship between teacher effectiveness and these three variables among prospective teachers, aiming to identify variations in effectiveness

Copyright © 2024 by Author/s and Licensed by Kuey. This is an open access article distributed under the Creative Commons Attribution License which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

based on gender, location, and academic background. By examining these relationships, the study contributes to a deeper understanding of how prospective teachers' skills and dispositions influence their potential effectiveness in diverse educational settings.

Teacher effectiveness refers to the degree to which a teacher successfully fosters learning, development, and positive outcomes in students, encompassing a range of competencies, skills, and behaviors that support an engaging and effective learning environment. Effective teaching is not only measured by the teacher's knowledge of the subject matter but also by their ability to adapt teaching methods to meet diverse student needs, encourage critical thinking, and foster independent learning (Stronge, Ward, & Grant, 2011). Metacognitive ability allows teachers to reflect on their thinking processes, enabling them to adjust teaching strategies for improved student outcomes (Schraw & Moshman, 1995). Teaching style impacts how content is delivered and received, influencing students' engagement and learning retention (Grasha, 1996). Meanwhile, digital competence, or the teacher's proficiency with digital tools and online teaching platforms, has become increasingly important as classrooms embrace more technology-driven approaches (Redecker & Punie, 2017). Together, these factors form a multifaceted view of teacher effectiveness that goes beyond traditional teaching methods and addresses the demands of contemporary classrooms.

Literature Review:

Teacher effectiveness, crucial to student success and educational quality, is influenced by metacognitive skills, teaching style, and digital competence. Teachers with strong metacognitive skills can better evaluate and adapt their methods, leading to improved student engagement (Kramarski & Michalsky, 2010). Artzt and Armour-Thomas (1998) found such skills promote reflective, adaptive teaching approaches, enhancing overall effectiveness, while Schraw and Moshman (1995) highlighted metacognition's role in self-regulation, positively impacting teaching efficacy. Teaching styles, ranging from authoritative to democratic, affect student outcomes differently (Grasha, 1996). Flexible, student-centered styles have been shown to improve engagement and outcomes (Trigwell, Prosser, & Waterhouse, 1999). Effective teachers often employ various styles to meet students' diverse needs, enhancing effectiveness (Gibbs & Coffey, 2004). Sharma and Pandey (2019) noted that adaptive teaching styles help prospective teachers build stronger connections with students, fostering a positive learning environment. Digital competence—skills to use digital tools effectively—has become essential in modern teaching (Ferrari, 2013). Tondeur et al. (2017) observed that digitally skilled teachers create more interactive lessons, enhancing teacher effectiveness. Digital competence promotes engaging, personalized learning (Almerich, Orellana, Suárez-Rodríguez, & Díaz-García, 2016), and Røkenes and Krumsvik (2016) found that digitally competent prospective teachers adapt well to today's teaching demands, boosting classroom effectiveness. The interplay between these factors is significant for prospective teachers. Mishra and Koehler's (2006) TPACK model highlights the need for integrating pedagogical, content, and technological knowledge in teaching. Scherer, Siddiq, and Tondeur (2019) found that effectiveness improves when teachers blend teaching skills with metacognitive and digital skills, while Howard, Ma, and Yang (2016) underscored digital competence as vital for teacher education in a technology-enhanced environment. Demographic variations also play a role. Female teachers tend to show higher metacognitive and digital skills, correlating with increased effectiveness (Lawson, Askell-Williams, & Murray-Harvey, 2006). Differences in rural and urban effectiveness often stem from resource access disparities (Darling-Hammond, 2006). Blömeke, Olsen, and Suhl (2016) found that urban candidates, with better digital access, tend to have higher digital competence.

Emergence of the Study: The changing dynamics of education in the 21st century demand a multifaceted approach to teacher training, particularly as prospective teachers prepare to enter increasingly digital and cognitively demanding classrooms. Teacher effectiveness, a critical factor in promoting student achievement, has been shown to be influenced by various cognitive and technological skills (Shulman, 1986; Darling-Hammond, 2000). In this context, metacognitive ability, which involves self-regulation and reflection on one's own thinking processes, plays a crucial role in enhancing teaching quality and adaptability (Flavell, 1979; Schraw & Dennison, 1994). Furthermore, teaching style—the manner and strategies that educators employ in the classroom—also affects teacher effectiveness, as it shapes student engagement and learning outcomes (Felder & Silverman, 1988). Digital competence, defined as the ability to effectively use digital technologies to enhance learning, has become particularly essential in the wake of rapid technological advancements and an increasing reliance on virtual learning environments (Ferrari, 2013). Despite this, limited research exists examining how these attributes jointly influence teacher effectiveness among prospective teachers, thus underscoring the importance of this study. In examining these relationships, this study addresses critical gaps in the literature by assessing how teacher effectiveness varies according to gender, geographic location, and academic background of prospective teachers. Gender, for example, has been previously found to impact both metacognitive abilities and teaching styles, suggesting potential differences in teacher effectiveness across male and female teachers (Zimmerman & Martinez-Pons, 1990). Meanwhile, digital competence, although widely recognized as essential in modern education, lacks adequate emphasis in teacher preparation programs, especially among prospective teachers from rural backgrounds, who may have limited exposure to digital tools and resources (Tondeur, van Braak, Ertmer, & Ottenbreit-Leftwich, 2017). By investigating these variables, this study provides insights that can inform teacher education curricula and professional development programs, highlighting the need for a

balanced focus on metacognitive skills, adaptable teaching styles, and digital competence to enhance teacher effectiveness.

Hypotheses of the Study

1. There is no significant difference in the mean scores of teacher effectiveness with respect to:
a. Gender
b. Locale
c. Stream
2. There is no significant difference in the mean scores of meta cognitive ability with respect to:
a. Gender
b. Locale
c. Stream
3. There is no significant difference in the mean scores of teaching style with respect to:
a. Gender
b. Locale
c. Stream
4. There exists no significant difference in the mean scores of digital competence with respect to:
a. Gender
b. Locale
c. Stream
5. There is no significant relation of teacher effectiveness with meta cognitive ability, teaching style and digital competence among prospective teachers.

Methodology

Research method: The present study falls under the domain of descriptive research.

Sample: The sample consists of 600 prospective teachers and were selected by stratified random sampling technique from different self-financed educational colleges affiliated to Guru Nanak Dev University, Amritsar, Panjab University, Chandigarh and Punjabi University, Patiala.

Tools Used:

The following tools were used for the study:
1. Teacher Effectiveness Scale (Suraiya & Shakir, 2023)
2. Meta-cognitive Ability skills Scale (Gupta & Suman, 2017)
3. Teaching Style Scale (Sharma & Saran, 2017)
4. Digital Competence Scale (Srivastava & Dangwal, 2021)

Interpretation and Discussions

HYPOTHESIS 1: There is no significant difference in the mean scores of teacher effectiveness of prospective teachers with respect to:
a. Gender
b. Locale
c. Stream

To test this hypothesis, Mean and S.D., S. E_M, and t- value of teacher effectiveness of prospective teachers with respect to gender, locale and stream were calculated and have been described in terms of mean, S.D., and t-value in the table 1.

Table 1 Mean and S.D., S. E_M, and t- value of teacher effectiveness of prospective teachers with respect to gender, locale, and stream

Variable Teacher Effectiveness	Category	N=600	Mean	S.D.	S. E_M	t- value
Gender	Male	171	120.96	43.88	3.35	**6.68**
	Female	429	143.49	34.30	1.65	
Locale	Rural	162	125.26	41.38	3.25	**4.63**
	Urban	438	141.44	36.63	1.75	
Stream	Science	282	135.95	37	2.20	**0.67**
	Arts	318	138.07	40	2.24	

Table 1 represents the mean scores of teacher effectiveness among prospective teachers with respect to gender, locale, and stream.

Gender: Male prospective teachers (N = 171) have a mean teacher effectiveness score of 120.96 with a standard deviation of 43.88. The standard error of the mean (SEM) is 3.35. Female prospective teachers (N = 429) have a mean score of 143.49 with a standard deviation of 34.30 and an SEM of 1.65. The calculated t-value for gender is 6.68, which is statistically significant when compared to the table value of 2.58 at 0.01 level of significance, indicating that gender has a statistically significant effect on teacher effectiveness scores among prospective teachers. Since the t-value is high, the null hypothesis that **There is no significant difference in the mean scores of teacher effectiveness among male and female prospective teachers** is **rejected**. The data suggests that female prospective teachers have higher effectiveness scores than males.

Locale: Prospective teachers from rural areas (N = 162) have a mean score of 125.26 with a standard deviation of 41.38 and an SEM of 3.25. Those from urban areas (N = 438) have a higher mean score of 141.44, with a standard deviation of 36.63 and an SEM of 1.75. The t-value for the difference in scores between rural and urban prospective teachers is 4.63, suggesting that the difference in teacher effectiveness based on locale is statistically significant. Thus, null the hypothesis that **There is no significant difference in the mean scores of teacher effectiveness among rural and urban prospective teachers** is **rejected.**

Stream: Prospective teachers from the science stream (N = 282) have a mean teacher effectiveness score of 135.95 with a standard deviation of 37 and an SEM of 2.20. Arts stream prospective teachers (N = 318) have a mean score of 138.07 with a standard deviation of 40 and an SEM of 2.24. The t-value for the difference between science and arts streams is 0.67, which is relatively low and suggests that the difference in teacher effectiveness based on stream is not statistically significant. Thus, null the hypothesis that **There is no significant difference in the mean scores of teacher effectiveness among science and arts prospective teachers** is **accepted.**

HYPOTHESIS 2: There is no significant difference in the mean scores of meta cognitive ability of prospective teachers with respect to:

a. Gender
b. Locale
c. Stream

To test this hypothesis, Mean and S.D., S. E_M, and t- value of meta cognitive ability of prospective teachers with respect to gender, locale and stream were calculated and have been described in terms of mean, S.D., and t-value in the table 2.

Table 2 Mean and S.D., S. E_M, and t- value of meta cognitive ability of prospective teachers with respect to gender, locale, and stream

Variable Meta Cognitive Ability	Category	N=600	Mean	S.D.	S. E_M	t- value
Gender	Male	171	143.54	49.35	3.77	**3.80**
	Female	429	127.57	45.20	2.18	
Locale	Rural	162	121.02	46.84	3.68	**3.55**
	Urban	438	136.23	46.35	2.21	
Stream	Science	282	139.40	49.35	2.93	**3.61**
	Arts	318	125.66	43.76	2.45	

Table 2 represents the mean scores of teacher effectiveness among prospective teachers with respect to gender, locale, and stream.

Gender: The sample includes 171 male and 429 female prospective teachers. The mean metacognitive ability score for males is 143.54, with a standard deviation (S.D.) of 49.35, and the standard error of the mean (S.E.M.) is 3.77. For females, the mean score is 127.57, with a standard deviation of 45.20 and an S.E.M. of 2.18. A t-value of 3.80 was calculated to determine the difference between the two means. Since the t-value for gender (3.80) exceeds the typical critical values in hypothesis testing (2.58 for a significance level of 0.01), the difference in mean scores between male and female prospective teachers is statistically significant. This suggests that gender does indeed have an impact on metacognitive ability scores, with males showing a higher mean score than females. Thus, leads to the **rejection** of the null hypothesis that **There is no significant difference in the metacognitive ability between male and female prospective teachers.**

Locale: The data on locale categorizes prospective teachers into rural (162 participants) and urban (438 participants). Rural prospective teachers have a mean score of 121.02, with an S.D. of 46.84 and an S.E.M. of 3.68, while urban teachers have a mean score of 136.23, with an S.D. of 46.35 and an S.E.M. of 2.21. The t-value

for locale is calculated to be 3.55. The t-value of 3.55 for locale is also higher than typical significance thresholds, indicating a statistically significant difference in metacognitive ability between rural and urban prospective teachers. Urban prospective teachers have higher mean scores in metacognitive ability than their rural counterparts, suggesting that locale influences metacognitive ability. Thus, leads to the **rejection** of the null hypothesis that **There is no significant difference in the metacognitive ability among rural and urban prospective teachers.**

Stream: The stream variable classifies prospective teachers into science (282 participants) and Arts (318 participants) streams. Science stream students have a mean metacognitive ability score of 139.40, with an S.D. of 49.35 and an S.E.M. of 2.93. Arts stream students have a mean score of 125.66, with an S.D. of 43.76 and an S.E.M. of 2.45. The t-value calculated for stream is 3.61. The t-value of 3.61 for stream indicates a statistically significant difference in metacognitive ability between Science and Arts stream prospective teachers. Science stream students have a higher mean score, suggesting that students in different academic streams may develop distinct levels of metacognitive ability, potentially due to the nature of their fields of study. Thus, leads to the **rejection** of the null hypothesis that **There is no significant difference in the metacognitive ability among science and arts prospective teachers.**

The results show statistically significant differences in metacognitive ability scores of prospective teachers with respect to gender, locale, and stream. Each factor has a significant effect, leading to the rejection of the null hypothesis across all three dimensions. This implies that gender, locale, and stream all play roles in shaping the metacognitive abilities of prospective teachers. The findings underscore the importance of considering these factors when evaluating or developing educational interventions aimed at enhancing metacognitive skills.

HYPOTHESIS 3: There is no significant difference in the mean scores of teaching style of prospective teachers with respect to:

a. Gender
b. Locale
c. Stream

To test this hypothesis, Mean and S.D., S. E_M, and t- value of teaching style of prospective teachers with respect to gender, locale and stream were calculated and have been described in terms of mean, S.D., and t-value in the table 3.

Table 3 Mean and S.D., S. E_M, and t- value of teaching style of prospective teachers with respect to gender, locale, and stream

Variable Teaching Style	Category	N=600	Mean	S.D.	S. E_M	t- value
Gender	Male	171	198.37	51.80	3.96	**3.52**
	Female	429	181.28	54.57	2.63	
Locale	Rural	162	169.70	56.07	4.40	**4.58**
	Urban	438	192.23	5.41	2.50	
Stream	Science	282	201.57	53.89	3.21	**6.79**
	Arts	318	172.47	50.98	2.85	

Table 3 represents the mean scores of teaching style among prospective teachers with respect to gender, locale, and stream.

Gender: The mean teaching style score for male prospective teachers (N=171) is 198.37, with a standard deviation of 51.80 and a standard error of the mean (S.E.M.) of 3.96. Female prospective teachers (N=429) have a mean score of 181.28, with a standard deviation of 54.57 and an S.E.M. of 2.63. The t-value of 3.52 indicates that there is a statistically significant difference in teaching style scores between male and female prospective teachers. Since the calculated t-value is greater than the table value of 2.58 at 0.01 level of significance This suggests that **There is no significant difference in the teaching style between male and female prospective teachers** is **rejected.**

Locale: Rural prospective teachers (N=162) have a mean teaching style score of 169.70, with a standard deviation of 56.07 and an S.E.M. of 4.40. Urban prospective teachers (N=438) score an average of 192.23, with a standard deviation of 5.41 and an S.E.M. of 2.50. The t-value of 4.58 suggests a statistically significant difference in teaching style scores between rural and urban prospective teachers. The null hypothesis i.e **There is no significant difference in the teaching style between rural and urban prospective teachers** is **rejected.**

Stream: Science-stream prospective teachers **(N=282)** have a mean teaching style score of 201.57, with a standard deviation of 53.89 and an S.E.M. of 3.21. Arts-stream teachers (N=318) score an average of 172.47, with a standard deviation of 50.98 and an S.E.M. of 2.85. The t-value of 6.79 reveals a statistically significant difference in teaching style scores between the science and arts streams. Since this t-value exceed critical values

for significance, the null hypothesis for the stream i.e **There is no significant difference in the teaching style between science and arts prospective teachers** is **rejected**. This result indicates that the stream of study does have a substantial effect on the teaching style scores, with science-stream teachers scoring higher than their arts-stream counterparts.
Based on the t-values obtained for gender (3.52), locale (4.58), and stream (6.79), each is statistically significant, leading to the rejection of the null hypothesis in all cases. This signifies that gender, locale, and stream each have a meaningful impact on the teaching style scores of prospective teachers, challenging the initial assumption of no difference across these categories.

HYPOTHESIS 4: There is no significant difference in the mean scores of digital competence of prospective teachers with respect to:
a. Gender
b. Locale
c. Stream
To test this hypothesis, Mean and S.D., S. E_M, and t- value of digital competence of prospective teachers with respect to gender, locale and stream were calculated and have been described in terms of mean, S.D., and t-value in the table 4.

Table 4 Mean and S.D., S. E_M, and t- value of digital competence of prospective teachers with respect to gender, locale, and stream

Variable Digital Competence	Category	N=600	Mean	S.D.	S. E_M	t- value
Gender	Male	171	48.37	6.96	0.53	**13.16**
	Female	429	36.61	10.81	0.52	
Locale	Rural	162	36.33	11.52	0.90	**4.91**
	Urban	438	41.30	10.79	0.51	
Stream	Science	282	42.54	10.82	0.64	**5.44**
	Arts	318	37.67	11.05	0.62	

Table 4 represents the mean scores of teacher effectiveness among prospective teachers with respect to gender, locale, and stream.

Gender: The mean teaching style score for male prospective teachers is 198.37, with a standard deviation of 51.80 and a standard error of the mean (S.E.M.) of 3.96. Female prospective teachers have a mean score of 181.28, with a standard deviation of 54.57 and an S.E.M. of 2.63. The t-value of 3.52 indicates that there is a statistically significant difference in teaching style scores between male and female prospective teachers. Since the t-value is typically compared against a critical value in significance testing and the null hypothesis i.e **There is no significant difference in the digital competence between male and female prospective teachers** is **rejected**. This suggests that gender does have a significant effect on the teaching style scores of prospective teachers, with males scoring higher on average than females.

Locale: Rural prospective teachers (N=162) have a mean teaching style score of 169.70, with a standard deviation of 56.07 and an S.E.M. of 4.40. Urban prospective teachers (N=438) score an average of 192.23, with a standard deviation of 5.41 and an S.E.M. of 2.50. The t-value of 4.58 suggests a statistically significant difference in teaching style scores between rural and urban prospective teachers. Thus, it leads to the **rejection** of the null hypothesis i.e **There is no significant difference in the digital competence between rural and urban prospective teachers**, indicating that locale has a significant effect on teaching style scores, with urban teachers scoring higher than rural teachers.

Stream: Science-stream prospective teachers (N=282) have a mean teaching style score of 201.57, with a standard deviation of 53.89 and an S.E.M. of 3.21. Arts-stream prospective teachers (N=318) have a mean score of of 172.47, with a standard deviation of 50.98 and an S.E.M. of 2.85. The t-value of 6.79 reveals a statistically significant difference in teaching style scores between the science and arts streams. Since this t-value exceeds the critical values for significance, the null hypothesis i.e **There is no significant difference in the digital competence between rural and urban prospective teachers** is **rejected**. This result indicates that the stream of study does have a substantial effect on the teaching style scores, with science-stream teachers scoring higher than their arts-stream counterparts.
In conclusion, based on the t-values obtained for gender (3.52), locale (4.58), and stream (6.79), each is statistically significant, leading to the rejection of the null hypothesis in all cases. This signifies that gender, locale, and stream each have a meaningful impact on the teaching style scores of prospective teachers, challenging the initial assumption of no difference across these categories.

Hypothesis 5: There is no significant relation of teacher effectiveness with meta cognitive ability, teaching style and digital competence among prospective teachers.
To test this hypothesis, the score of coefficient of correlation of teacher effectiveness with meta cognitive ability, teaching style and digital competence among prospective teachers have been shown in the table 5.

Table 5: Coefficient of correlation of teacher effectiveness with meta cognitive ability, teaching style and digital competence among prospective teachers

Variable	Teacher Effectiveness	Meta Cognitive Ability	Teaching Style	Digital Competence
Teacher Effectiveness	1	0.52	0.61	0.76
Meta Cognitive Ability	0.52	1	--	--
Teaching Style	0.61	--	1	
Digital Competence	0.76	--	--	1

Table 5, displays the correlation values between teacher effectiveness, metacognitive ability, teaching style, and digital competence.

Interpretation of Each Correlation Coefficient

1. **Teacher Effectiveness and Metacognitive Ability**: The correlation between teacher effectiveness and metacognitive ability is 0.52. This positive correlation indicates a moderate positive relationship, suggesting that as teachers' metacognitive ability increases, their effectiveness also tends to increase, although this relationship is not extremely strong.
2. **Teacher Effectiveness and Teaching Style**: The correlation between teacher effectiveness and teaching style is 0.61, showing a moderate to strong positive relationship. This suggests that an effective teaching style tends to be associated with higher teacher effectiveness. In other words, prospective teachers with effective teaching styles are likely to be more effective overall.
3. **Teacher Effectiveness and Digital Competence**: The correlation between teacher effectiveness and digital competence is 0.76, indicating a strong positive relationship. This suggests that digital competence is closely associated with teacher effectiveness. Therefore, as digital competence increases, teacher effectiveness is also likely to increase significantly.

Rejection of the Hypothesis: Since each correlation value (0.52, 0.61, and 0.76) indicates a positive relationship between teacher effectiveness and the other three variables. The moderate to strong positive relationships, particularly between teacher effectiveness and digital competence (0.76), provide enough grounds to **reject** the null hypothesis i.e **There is no significant relation of teacher effectiveness with meta cognitive ability, teaching style and digital competence among prospective teachers**.

Findings of the Study

1. The study found a significant difference in the mean scores of teacher effectiveness based on gender and locale whereas significant difference found between science and arts stream prospective teachers, indicating that prospective teachers' effectiveness varied notably when analyzed by these demographic factors, suggesting that teacher effectiveness may be influenced by these characteristics.
2. Significant differences were observed in the mean scores of metacognitive ability across gender, locale, and stream, which implies that metacognitive abilities among prospective teachers are not uniformly distributed but are influenced by these demographic distinctions.
3. The findings also revealed a significant difference in the mean scores of teaching style across gender, locale, and stream, indicating that the teaching style preferences and competencies among prospective teachers vary according to these demographic variables.
4. There is a significant difference in digital competence scores based on gender, locale, and stream, suggesting that prospective teachers' digital competence is not consistent across these groups and may be shaped by these demographic factors.
5. Finally, the study indicates a significant relationship between teacher effectiveness and the factors of metacognitive ability, teaching style, and digital competence, suggesting that these variables are positively associated with one another, and higher levels in one may contribute to enhanced teacher effectiveness.

Educational Implications

1. ***Differentiated Teacher Training Programs:*** Since teacher effectiveness varies by gender, locale, and stream, training programs should be tailored to address these differences. Educational institutions might consider designing targeted professional development workshops to cater to the unique needs and strengths of teachers from diverse backgrounds, helping them maximize their effectiveness in the classroom.
2. ***Enhancement of Metacognitive Skills in Teacher Education:*** The variation in metacognitive ability across gender, locale, and stream suggests a need for teacher education programs to incorporate explicit

instruction in metacognitive strategies. This could involve offering workshops or courses that focus on self-reflection, self-regulation, and problem-solving skills, enabling teachers to model and teach these skills to their students.

3. ***Adaptation of Teaching Style Training*:** Since teaching style differs significantly across demographic factors, teacher preparation programs could provide guidance on diverse teaching approaches, ensuring that teachers are equipped to adapt their style to suit different learning environments and student needs. Encouraging adaptability and offering practice in a variety of teaching methods could support more effective teaching practices across varied classroom settings.
4. ***Focused Digital Competence Development*:** The differences in digital competence among prospective teachers indicate a need for enhanced, differentiated digital training, especially in response to gender, locale, and stream disparities. Providing specialized digital literacy programs or workshops tailored to teachers' backgrounds could promote equitable access to technology skills, ensuring that all teachers are prepared to integrate digital tools effectively in their instruction.
5. ***Integrated Approach to Teacher Effectiveness*:** Given the significant relationship between teacher effectiveness and metacognitive ability, teaching style, and digital competence, teacher education programs should adopt a holistic approach that combines these elements. Developing a curriculum that integrates cognitive skills, adaptable teaching strategies, and digital competence will foster well-rounded educators who can enhance student learning and engagement across diverse settings.

References

1. Almerich, G., Orellana, N., Suárez-Rodríguez, J., & Díaz-García, I. (2016). Teachers' information and communication technology competencies: A structural approach. *Computers & Education, 100*, 110-125.
2. Artzt, A. F., & Armour-Thomas, E. (1998). Development of a cognitive–metacognitive framework for protocol analysis of mathematical problem solving in small groups. *Cognition and Instruction, 16*(2), 137–175.
3. Blömeke, S., Olsen, R. V., & Suhl, U. (2016). Relation of student achievement to the quality of their teachers and instructional quality. *Teaching and Teacher Education, 63*, 75-87.
4. Darling-Hammond, L. (2000). *Teacher quality and student achievement: A review of state policy evidence*. Education Policy Analysis Archives, 8(1), 1-44.
5. Darling-Hammond, L. (2006). *Powerful teacher education: Lessons from exemplary programs*. Jossey-Bass.
6. Ferrari, A. (2013). DIGCOMP: *A Framework for Developing and Understanding Digital Competence in Europe*. Publications Office of the European Union.
7. Flavell, J. H. (1979). Metacognition and cognitive monitoring: A new area of cognitive-developmental inquiry. *American Psychologist, 34*(10), 906–911.
8. Gibbs, G., & Coffey, M. (2004). The impact of training of university teachers on their teaching skills, their approach to teaching and the approach to learning of their students. *Active Learning in Higher Education, 5*(1), 87-100.
9. Grasha, A. F. (1996). *Teaching with style: A practical guide to enhancing learning by understanding teaching and learning styles*. Alliance Publishers.
10. Howard, S. K., Ma, J., & Yang, J. (2016). Student rules: Exploring patterns of students' computer-efficacy and engagement with digital technologies in learning. *Computers & Education, 101*, 29-42.
11. Kramarski, B., & Michalsky, T. (2010). Preparing preservice teachers for self-regulated learning in the context of technological pedagogical content knowledge. *Learning and Instruction, 20*(5), 434–447.
12. Lawson, M. J., Askell-Williams, H., & Murray-Harvey, R. (2006). The attributes of effective teachers: Teachers' accounts of successful teaching practices. *Social Psychology of Education, 9*(1), 1-30.
13. Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record, 108*(6), 1017–1054.
14. Redecker, C. (2017). *European Framework for the Digital Competence of Educators: DigCompEdu*. Publications Office of the European Union.
15. Røkenes, F. M., & Krumsvik, R. J. (2016). Prepared to teach digitally? A study of teacher educators' professional digital competence. *Teaching and Teacher Education, 55*, 1-12.
16. 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*, 13-35.
17. Schraw, G., & Moshman, D. (1995). Metacognitive theories. *Educational Psychology Review, 7*(4), 351–371.
18. Sharma, S. (2017). Meta-cognition as a predictor of teacher effectiveness among secondary school teachers. *International Journal of Research in Social Sciences, 7*(11), 276-285.
19. Sharma, S., & Pandey, R. (2019). The impact of teaching style on student outcomes in secondary education. *Journal of Educational Research, 62*(3), 240-258.
20. Stronge, J. H. (2018). *Qualities of effective teachers* (3rd ed.). ASCD.

21. Tondeur, J., Aesaert, K., Pynoo, B., van Braak, J., Fraeyman, N., & Erstad, O. (2017). Developing a validated instrument to measure preservice teachers' ICT competencies: Meeting the demands of the educational field. *Computers in Human Behavior, 30*(8), 1-14.
22. Trigwell, K., Prosser, M., & Waterhouse, F. (1999). Relations between teachers' approaches to teaching and students' approaches to learning. *Higher Education, 37*(1), 57-70.