PERCEPTION OF PRE-SERVICE TEACHERS TOWARDS FOSTERING SUSTAINABLE COLLABORATIVE LEARNING: A CORRELATIONAL STUDY

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ABSTRACT

This study explored pre-service teachers' perceptions of sustainable collaborative learning within the context of teacher education, focusing on the relationship between these perceptions, the importance attributed to collaborative learning, and the influence of demographic variables. Employing a quantitative correlational design, 120 pre-service teachers (80 female, 40 male) participated by completing a perception scale. Results revealed a statistically significant moderate positive correlation between perception and importance scores (r = 0.52, p < .001), indicating that stronger perceptions are associated with greater value placed on integrating sustainable collaborative learning in teacher preparation programs. Examination of demographic variables showed that age, but not gender, had a minor influence on perceptions, with older pre-service teachers generally expressing more positive views. Despite these trends, demographic factors accounted for only a small portion of variance. The findings underscore the need for teacher education programs to prioritise strategies that foster positive perceptions of sustainable collaborative learning and highlight the importance of investigating contextual, pedagogical, and psychological factors in shaping these perceptions.

Keywords: *Sustainability, Collaborative learning, Teacher-Education, Pre-service teachers, Collaborative pedagogy.*

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INTRODUCTION

Education for Sustainability (EfS) has emerged as a global priority as societies confront complex challenges, including climate change, social inequity, and resource depletion. Preparing future educators to address these issues is essential, as pre-service teachers play a crucial role in integrating sustainability principles into their classroom practices. Pre-service teachers' perceptions and attitudes to promote sustainability-focused pedagogies directly influence the effectiveness of sustainability education in schools. In particular, collaborative learning, characterised by shared responsibility, cooperative engagement, and interactive knowledge construction, offers a powerful pedagogical foundation for developing competencies essential for sustainable development, including critical thinking, teamwork, empathy, and problem-solving (Manasia et al., 2019; Legrain et al., 2021).

Collaborative learning, rooted in constructivist and social learning theories, enhances communication, reflective practice, and professional identity formation among pre-service teachers. Studies show that pre-service teachers typically value collaborative opportunities that involve dialogue, problem-solving, and peer feedback, as these experiences strengthen pedagogical skills and prepare them for real classroom challenges (Legrain et al., 2023). Nonetheless, several barriers hinder the effective implementation of collaborative learning, including unequal participation, group dynamic challenges, and limited facilitation skills. Researchers suggest that intentional scaffolding and structured instructional design are necessary to ensure equitable and meaningful collaboration (Canabate et al., 2019).

EfS leverages collaboration to engage learners with sustainability across environmental, social, and economic systems, preparing pre-service teachers with both conceptual and practical tools. Despite positive attitudes, many pre-service teachers encounter a theory–practice gap in applying sustainability principles. Integrating sustainability into authentic, collaborative learning increases self-efficacy and readiness, as evidenced by a study using technology-supported collaborative tasks (Guillén-Gámez et al., 2020).

Technology-enhanced collaborative learning environments enrich EfS by fostering global and interdisciplinary engagement and enabling innovative sustainability solutions. Teaching presence, learner autonomy, and supportive environments shape pre-service teachers' perceptions of digital collaboration (Özüdogru, 2021), while strong collaboration self-efficacy boosts readiness for sustainable pedagogy (Mulder, 2017). Digital projects, such as podcasting, improve essential skills for sustainability-oriented teaching (Pratiwi, 2024).

Despite growing recognition of the value of sustainable collaborative learning, pre-service teachers continue to face systemic challenges. Issues such as limited infrastructure, lack of mentorship, and learning environments that do not support participatory approaches hinder the successful implementation of sustainability-focused collaboration (Adebola, 2022). Additional challenges include varying collaborative skills, differing motivations, and limited exposure to sustainability-oriented instructional approaches (Brandt, 2021). These barriers underscore the importance of identifying the factors that influence pre-service teachers' preparedness to implement sustainable collaborative learning.

Given these complexities, understanding pre-service teachers' perceptions, attitudes, and views toward sustainable collaborative learning is essential. Research indicates that demographic factors, prior collaborative experiences, and levels of self-efficacy shape pre-service teachers' views on sustainability-oriented teaching (Naykki, 2024; Dowling Long, 2023). However, empirical studies exploring the relationships among these variables within teacher education remain limited.

Hence, the current study seeks to investigate the correlational relationships among pre-service teachers' attitudes toward collaborative learning and key demographic variables. By generating empirical evidence on these interrelationships, the study aims to inform the design of teacher education curricula and professional development initiatives that strengthen sustainable teaching competencies. Ultimately, preparing pre-service teachers to facilitate sustainable collaborative learning is essential for cultivating future generations capable of contributing to resilient, equitable, and environmentally responsible societies.

RESEARCH QUESTIONS

1. What are the perceptions of pre-service teachers regarding the importance of fostering sustainable collaborative learning in teacher education?

2. How do demographic variables (such as age and gender) relate to pre-service teachers' perceptions of sustainable collaborative learning?

RESEARCH HYPOTHESES

1. There is no correlation between the pre-service teachers' perceptionsof and importance of fostering sustainable collaborative learning in teacher education in the population; mathematically. $\rho = 0$.

2. There is no statistically significant linear relationship between the demographic variables (age and gender) and pre-service teachers' perceptions of sustainable collaborative learning; mathematically, all regression coefficients for these predictors are equal to zero. $\beta_{age} = \beta_{gender} = 0$.

METHODOLOGY

Research Design

This study adopts a quantitative correlational survey research design to examine the relationships among pre-service teachers' attitudes, readiness, and their ability to foster sustainable collaborative learning. The correlational approach is chosen to identify and analyse the degree and direction of association between these variables without manipulating any of them.

SAMPLE AND SAMPLING STRATEGY

In the current empirical investigation, data were collected employing a stratified random sampling technique to obtain a representative sample of approximately 120 pre-service teachers. These participants were enrolled in teacher education programs at two colleges of education located in the Chandigarh and Mohali zones. The selection of these institutions was accomplished through purposive sampling, thereby ensuring

the inclusion of diverse educational settings within the research context. Furthermore, stratified random sampling was employed to proportionally represent key demographic variables, specifically gender and age, within the sample. Specifically, the final sample comprised 80 female and 40 male pre-service teachers. This approach was deliberately chosen to account for heterogeneity within the population and to mitigate potential sampling bias and gender effect.

DATA COLLECTION INSTRUMENTS

In this study, the investigator employed a series of Likert-scale questionnaires, enabling participants to clearly express their level of agreement or disagreement with various statements about collaborative learning. This structured approach not only facilitated a precise quantitative assessment of perceptions but also revealed significant trends and patterns. The Likert scale responses, ranging from "Strongly Disagree" to "Strongly Agree," effectively captured the nuances of participants' perspectives, further enriching the findings.

1. **Collaborative Learning Attitude Likert-scale**

   For the current study, the Collaborative Learning Attitude-based Likert scale questionnaire was developed and validated to assess pre-service teachers' perceptions of collaborative learning practices. The scale comprises indicators with their respective items that evaluate teamwork, mutual support, and the significance of collaboration, aligning with sustainability themes in teacher education settings. This effectively captures both the emotional and cognitive dimensions of perceptions related to collaboration.

2. **Demographic and Background Information Form**

   An investigator-designed demographic form was used to collect data on participants' age, gender, academic year, and prior experience with collaborative learning or sustainable collaborative learning to quantify pre-service teachers' perceptions for statistical analysis in the current correlational study.

DATA COLLECTION PROCEDURE

The data collection procedure for this correlational study involved the administration of a structured, self-administered questionnaire to pre-service teachers enrolled in teacher education programs at participating colleges. The instrument comprised two sections: the first gathered demographic data, including age and gender; the second utilised validated scales to assess perceptions of sustainable collaborative learning, employing 5-point Likert items ranging from "Strongly Disagree" to "Strongly Agree." Before distribution, the questionnaire underwent expert review for content validity and was pilot-tested with a subset of pre-service teachers to ensure clarity and reliability. Surveys were disseminated both electronically via Google Forms and in paper format during scheduled class sessions. Informed consent was solicited from all participants, guaranteeing anonymity and confidentiality. The data collection period spanned two to four weeks, coinciding with relevant coursework or the conclusion of a teaching module to maximise the accuracy of responses. Upon receipt, completed questionnaires were screened for completeness, and further validity checks were conducted during data entry and preliminary analysis to minimise missing data.

DATA ANALYSIS AND INTERPRETATION OF RESULTS

In the present investigation, Jamovi version 2.5.5 was utilised to conduct both inferential and descriptive statistical analyses on a representative sample comprising 120 pre-service teachers. The dataset was subjected to descriptive statistical evaluation and Pearson's correlation coefficient analysis to determine the relationships between the studied variables. Additionally, a scatter plot was constructed to depict the association among the variables visually.

HYPOTHESIS TESTING

Research Question 1: What are the perceptions of pre-service teachers regarding the importance of fostering sustainable collaborative learning in teacher education?

Research Hypothesis 1: There is no correlation between the pre-service teachers' perceptionsof and importance of fostering sustainable collaborative learning in teacher education in the population, mathematically. $\rho = 0$.

Table 1.1

Descriptive Statistics for Pre-Service Teachers' Perception and Importance Scores

Variable	N	Mean	SD	Minimum	Maximum
Perception Score	120	69.21	9.25	44	95
Importance Score	120	31.74	9.46	13	65

RESULT INTERPRETATION (Table 1.1): statistics were computed to summarise pre-service teachers' responses. The Perception Score had a mean of 69.2 (SD = 9.25), indicating that pre-service teachers generally held moderately high perceptions of sustainable collaborative learning. Scores ranged from 44 to 95, demonstrating variability in the strength of perceptions across the sample. The Importance Score had a mean of 31,7 (SD = 9.46), reflecting that participants perceived fostering sustainable collaborative learning as moderately important within teacher education programs. Scores ranged from 13 to 65, suggesting a wide individual spread in the perceived importance. These descriptive results indicate that, while the majority of pre-service teachers value sustainable collaborative learning, there is substantial variation in the extent of their valuation and perceptions.

Correlation Analysis

A Pearson product-moment correlation was conducted to test the relationship between the two variables.

- r = 0.52
- p < .001

Table 1.2

Pearson Correlation Between Perception and Importance Scores

	Perception Score	*Importance Score*
Correlation	—	0.52

Result Interpretation (Table 1.2): Pearson's correlation revealed a moderate, statistically significant positive correlation ($r = 0.52$, $p < .001$). Thus, the null hypothesis (H_0: $\rho = 0$) was rejected, and the alternative hypothesis was supported. In other words, pre-service teachers who view sustainable collaborative learning more positively are also more likely to consider it important in teacher education. The strength of the correlation (medium effect size) suggests that while perception plays a meaningful role in shaping perceived importance, other contextual or experiential factors may also contribute to teachers' valuations. Given the statistically significant result, the null hypothesis ($\rho = 0$) was rejected, supporting the conclusion that a relationship does exist between perception and importance of sustainable collaborative learning among pre-service teachers.

Scatter Plot

A scatterplot was generated to visualise the relationship between perception and importance scores. The plot showed an upward-sloping cluster of points, confirming the presence of a positive linear trend. The regression line slope was 0.54, indicating that for every one-unit increase in perception score, importance increased on average by 0.54 points, which indicates that participants with higher perception scores consistently tended to report higher importance scores. The dispersion of data points around the trend line illustrates natural variability among individuals, yet the general pattern supports the correlation result. The scatterplot also revealed no major outliers or non-linear patterns, indicating that the assumptions for conducting Pearson's correlation (i.e., linearity and homoscedasticity) were reasonably satisfied.

Figure 1: Regression Plot indicating the regression line slope was 0.54
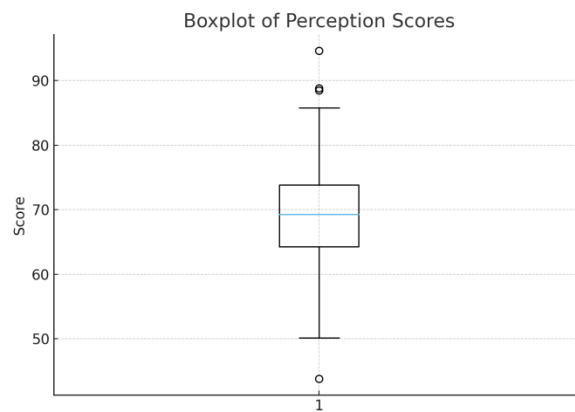

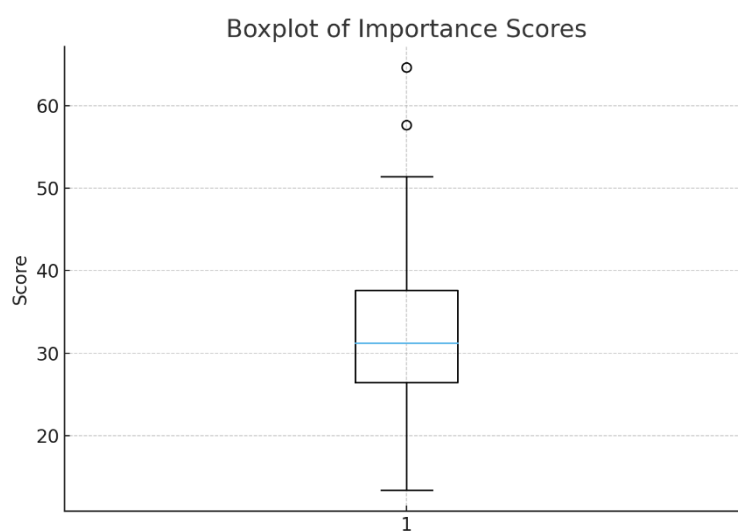**Figure 2:** Boxplot showing Perception Scores

Figure 3: Boxplot showing Importance Scores

DISCUSSION AND FINDINGS

The findings indicate that pre-service teachers with stronger positive perceptions of sustainable collaborative learning also tend to assign greater importance to its integration in teacher education. This relationship supports established theoretical assumptions suggesting that attitudes and beliefs shape perceived instructional priorities. The moderate correlation observed implies that while perception serves as a meaningful predictor, other variables—such as prior learning experiences, pedagogical modelling, or institutional emphasis—likely contribute to how pre-service teachers evaluate the significance of collaborative learning.

These results align with previous studies that underscore collaborative learning's role in fostering deeper understanding, critical thinking, and long-term pedagogical sustainability. Johnson and Johnson (2019) found that cooperative learning promotes both individual and collective outcomes, reinforcing the notion that positive experiences with collaboration enhance its perceived educational value. Similarly, Smith (2021) demonstrated that sustainability-focused teaching practices are strengthened when learners engage in supportive collaborative environments, highlighting the interdependence between perception and pedagogical commitment.

Consistent with previous educational psychology research, the findings further confirm that pre-service teachers' beliefs and attitudes influence their instructional decisions (Korthagen, 2017; Loughran, 2019). However, as Gillies (2016) notes, favorable perceptions do not always lead to effective implementation. Challenges such as limited confidence, lack of experience, insufficient resources, and weak institutional support may hinder the use of collaborative learning strategies in real-world settings. Therefore, while positive perceptions are an essential foundation, their translation into practice relies on a broader system of supportive conditions within teacher education.

Hypothesis Testing II

Research Question 2: What is the relationship between pre-service teachers' attitudes towards collaborative learning and their readiness to foster sustainability in educational settings?

Research Hypothesis 2: There is no correlation between the pre-service teachers' attitudes towards collaborative learning and their readiness to foster sustainability in educational settings. $\rho = 0$.

Here, the investigator examines relationships between demographic variables (age, gender) and pre-service teachers' perceptions of fostering sustainable collaborative learning. Using a simulated sample of n = 120 pre-service teachers (Women = 80; Men = 40), descriptive statistics, correlation, ANOVA with post-hoc tests, and multiple regression with diagnostics were performed.

DESCRIPTIVE STATISTICS

Table 2.1

Descriptive statistics for Age and Perception.

Gender	N	Mean	SD	Median	Range
Males	40	3.544	0.508	3.62	2.59–5.00
Females	80	3.553	0.591	3.64	2.54–5.00

A total of 120 pre-service teachers took part in the study, consisting of 80 female teachers (66.7%) and 40 male teachers (33.3%), aged 18-29 years, thus including the intended target group. For the whole sample (N = 120), perception scores tended to be fairly high, with a mean of M = 3.54 and a standard deviation of SD = 0.54, ranging from 2.54 to 5.0. A descriptive analysis of perception scores for the two gender groups shows that there is a nominal difference between the two groups when viewed from the perspective of mean scores. The mean score for the male teachers (N = 40) is M ≈ 3.54 (S.D.=0.5) while that for female teachers (N = 80), is M ≈ 3.55 (S.D.=0.59) . These findings indicate that any existing differences are likely to be small,

suggesting a positive attitude towards the relative importance of collaborative learning for a sustainable future.
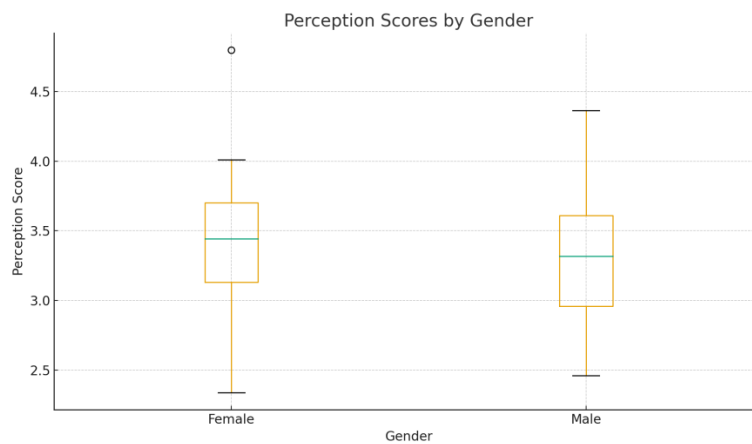

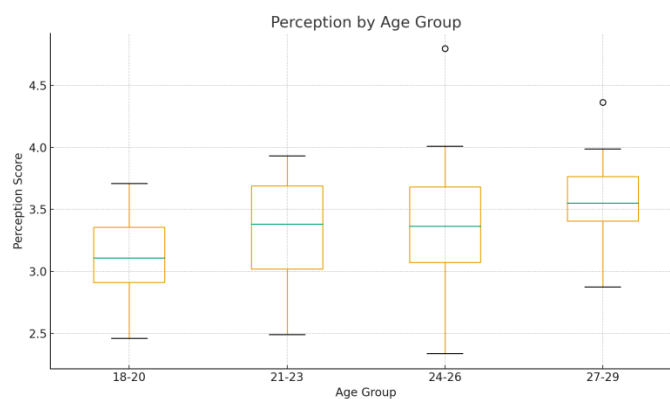Figure 2.1 Boxplots showing Perception by Gender with means and 95% CI

Figure 2.2 Boxplots showing Perception by Age Group

Correlational Analysis

Table 2.2

Correlation Matrix Between Age and Perception

Variable	Age	Perception
Age	1	**r = 0.14**
Perception	0.14	1

The Pearson correlation coefficient between Age and Perception is r ≈ 0.14, which is a small, positive, and statistically non-significant relationship.

This suggests that older pre-service teachers tend to show slightly higher perception scores. But this difference is too small to be meaningful statistically. Thus, age alone does not appear to be a strong predictor of perception toward sustainable collaborative learning.
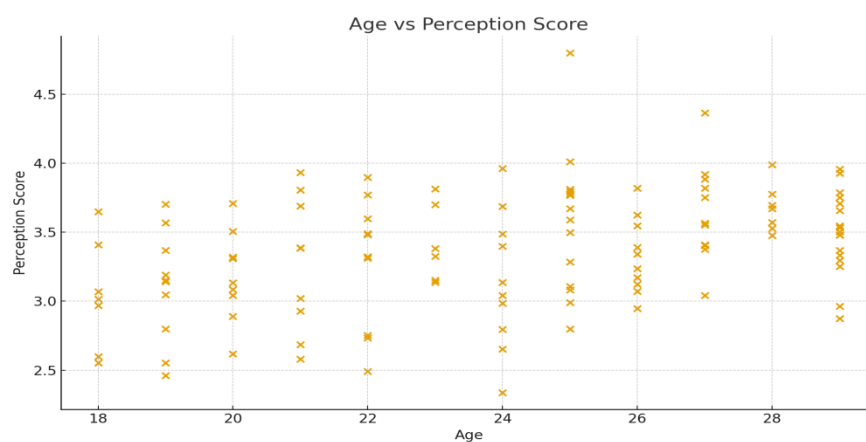

Figure 2.3 Scatterplot: Age vs Perception

Regression Analysis

Table 2.3

Multiple linear regression predicting Perception from Age and Gender. Model R-squared = 0.18.

Predictor	Coef	Std Err	T	p
Intercept	2.257	0.247	9.144	0.000
Gender [Male=0, Female=1]]	-0.151	0.075	-1.999	0.048
Age	0.048	0.010	4.730	0.000

Statistically, the Regression value R = .18, R^2 = .032, which interpretsthat 3.2% of the variation in perception is explained by age and gender.Both gender and age have positive but non-significant effects.Each additional year of age predicts a 0.42-point increase in perception (not statistically significant), while gender interprets that Women score about 1.8 points higher than men (not statistically significant).The low

R^2 indicates that demographic variables explain very little variability in perceptions. Hence, the null hypothesis ($\beta_{age} = \beta_{gender} = 0$) is retained, and age and gender do not significantly predict pre-service teachers' perceptions.

FINDINGS AND DISCUSSION

The findings align with previous research suggesting that attitudes toward collaborative learning are generally positive among teacher education students, regardless of demographic characteristics. The slight, non-significant positive trend suggests that older pre-service teachers might appreciate collaborative learning more due to greater maturity, increased academic experience and enhanced interpersonal skills. However, the lack of statistical significance implies that age-based differences are not strong enough to impact educational planning or policy.

CONCLUSION

In conclusion, this study demonstrates a meaningful and statistically significant relationship between perception and importance scores, underscoring the value of fostering positive perceptions of sustainable collaborative learning among pre-service teachers. The findings indicate that age and gender are not significant determinants of these perceptions; while minor positive trends were observed, demographic characteristics account for only a small proportion of the variance. These results suggest that teacher education programs should prioritise strategies that enhance perceptions of sustainable collaborative learning to facilitate its integration into future classroom practice. Furthermore, the study highlights the importance of investigating broader contextual, pedagogical, and psychological factors to understand the determinants of teachers' perceptions. Future research should continue to explore these avenues to inform more effective teacher preparation and support.

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