



# Effect of Classroom Seating Arrangements on Student Participation

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## Abstract

Classroom seating arrangements play a crucial role in the learning environment, yet they are often underestimated in their impact on student participation in higher education (Srivastava & Gupta, 2019). As the focus shifts towards student-centered learning, it becomes essential for educators to comprehend how the physical setup of a classroom can affect participation, interaction, and engagement. This research investigates the influence of seating arrangements on student participation by employing basic statistical methods like correlation, regression, and analysis of variance (ANOVA). The study emphasizes key factors such as seating configurations, student interaction, and classroom engagement. Recent studies suggest that seating layouts significantly affect students' attention, communication, and participation (Seet et al., 2022; Wasendorf et al., 2023). Arrangements that encourage interaction, such as clusters and circular setups, are more effective in fostering engagement and participation compared to traditional row-based seating (Haya, 2025; Kumar et al., 2026). Moreover, seating designs that enhance proximity and visibility improve peer interactions, leading to greater student involvement (Gao et al., 2021). The results indicate that seating arrangements have a notable positive impact on student participation and are closely linked to student interaction. Classroom engagement also plays a significant

role in influencing participation. Additionally, notable differences in participation levels were found among various seating arrangements, with interactive layouts proving to be more effective. The study concludes that seating arrangements are a crucial pedagogical element that can boost student participation when integrated with interactive teaching methods. By implementing flexible seating strategies, educators can foster more engaging and inclusive learning environments for students.

**Keywords:** Classroom seating arrangement, student participation, student interaction, classroom engagement, learning environment, higher education



## 1) Introduction with Background and Rationale of the Study

The contemporary education system is increasingly transitioning from traditional teacher-centered approaches to student-centered learning environments, where active participation, collaboration, and engagement are considered essential for effective learning outcomes (Gupta, 2016). In this evolving context, the physical design of the classroom—particularly seating arrangement—has gained attention as an important factor influencing student behavior and interaction. Despite this shift, many classrooms still rely on conventional row-based seating layouts, which may limit communication, reduce interaction, and ultimately hinder student participation. Classroom seating arrangement refers to the physical organization of desks and chairs within a learning space, which determines how students interact with each other and with the instructor. Research suggests that seating configurations significantly influence students' attention, communication patterns, and willingness to participate in classroom activities (Seet et al., 2022; Gao et al., 2021). For example, interactive seating arrangements such as clusters, circular, and U-shaped layouts facilitate peer discussion and collaborative learning, whereas traditional row arrangements tend to restrict interaction and promote passive learning (Wannarka & Ruhl, 2008; Haya, 2025). Recent empirical studies further highlight that seating position and proximity to the instructor play a crucial role in shaping participation. Students seated closer to the teacher or in interactive layouts demonstrate higher levels of engagement and participation compared to those seated farther away (Wasendorf et al., 2023). Similarly, flexible seating arrangements have been shown to enhance motivation, comfort, and inclusivity, thereby encouraging students to actively engage in classroom activities (Kumar et al., 2026). In addition to direct effects, classroom seating arrangement influences key behavioral and psychological factors such as student interaction and classroom engagement, which are essential drivers of participation (Chandra & Gupta 2024). Studies indicate that seating layouts that promote communication and collaboration lead to increased interaction among students, which in turn enhances

participation (Gao et al., 2021). Likewise, higher levels of engagement—characterized by attention, interest, and involvement—are associated with greater participation in classroom discussions and activities (Fredricks et al., 2004). Despite growing recognition of the importance of classroom seating arrangement, existing research remains fragmented. Many studies focus on isolated outcomes such as engagement or academic performance, without providing a comprehensive and simplified analysis of how seating arrangement influences student participation through interaction and engagement. Furthermore, limited research has applied basic statistical techniques (such as correlation, regression, and ANOVA) to examine these relationships in a clear and practical manner, particularly in higher education contexts. By focusing on simple and interpretable statistical methods, the study ensures practical applicability for educators and researchers. The findings are expected to provide valuable insights for designing effective and interactive classroom environments that promote student participation. Finally we can say that, classroom seating arrangement is not merely a physical or administrative concern but a strategic pedagogical factor that significantly influences student participation, interaction, and engagement. Understanding these relationships is essential for improving teaching practices and enhancing learning outcomes. This study contributes to the field by offering a clear, evidence-based understanding of how classroom design can be optimized to support active learning.

## 2) Literature Review

### 2.1 Classroom Seating Arrangement and Student Participation

Increasingly, the arrangement of classroom seating is being acknowledged as a crucial environmental factor that affects student engagement and learning behaviour. Recent research indicates that the classroom's physical setup influences students' focus, communication, and participation in academic tasks. For example, Seet et al. (2022) discovered that the seating configuration significantly affects student engagement and participation by shaping visibility and interaction patterns. Likewise, Wasendorf et al. (2023) observed that students positioned closer to the



teacher tend to participate more actively than those seated further away. Empirical studies also suggest that traditional row-based seating often restricts interaction and fosters passive learning, whereas seating arrangements like clusters and circular layouts encourage active participation (Wannarka & Ruhl, 2008; Haya, 2025). Kumar et al. (2026) further emphasize that flexible seating arrangements enhance student comfort, inclusivity, and participation by fostering a more dynamic learning environment (Sharma & Gupta, 2018). These findings suggest a direct link between seating arrangement and student participation, which can be effectively analysed using regression and ANOVA techniques.

## 2.2 Seating Arrangement and Student Interaction

Student interaction plays a vital role in connecting the classroom environment with learning outcomes. Studies indicate that how students are seated affects both the extent and quality of their communication. According to Gao et al. (2021), the way seats are arranged has a notable impact on peer interaction and collaborative learning. Seating layouts that promote interaction, like clusters, foster discussion and teamwork, while traditional seating setups limit communication. Similarly, Haya (2025) observed that seating arrangements significantly affect student interaction and motivation, with group-based seating leading to higher collaboration levels. These findings imply a positive relationship between seating arrangements and student interaction, suggesting that correlation analysis is a suitable method to explore this connection (Reghuthaman & Gupta, 2018).

## 2.3 Classroom Engagement and Student Participation

Student engagement in the classroom, encompassing behavioural, emotional, and cognitive involvement in learning tasks, serves as a crucial indicator of student participation. Fredricks et al. (2004) describe engagement as a multifaceted concept that plays a significant role in shaping academic results. Recent research corroborates the strong link between engagement and participation. Seet et al. (2022) discovered that students who exhibit higher levels of engagement are more

inclined to take an active role in classroom discussions and activities. Additionally, Kumar et al. (2026) highlight that the design of the classroom, including how seating is arranged, boosts engagement, thereby enhancing participation. These findings advocate for the application of regression analysis to explore how classroom engagement affects student participation.

## 2.4 Comparative Effect of Different Seating Arrangements

Numerous studies have evaluated the impact of various seating configurations on effectiveness. Research consistently indicates that interactive seating setups, such as clusters, circles, and flexible arrangements, result in greater participation levels than traditional row seating. Wannarka and Ruhl (2008) discovered that seating designs promoting interaction notably enhance both academic and behavioral outcomes. More recent research supports the idea that flexible seating fosters inclusivity and equal participation among students (Kumar et al., 2026; Haya, 2025). These results support the application of ANOVA to compare participation across different seating configurations.

## 3) Theoretical Foundation

### 3.1 Proximity Control Theory

Proximity control theory suggests that students seated closer to the instructor are more attentive and participative. Wasendorf et al. (2023) provide empirical support for this theory, showing that seating position significantly influences participation and academic performance.

### 3.2 Social Constructivist Theory (Vygotsky, 1978)

Social constructivism emphasizes that learning occurs through social interaction and collaboration. Seating arrangements that facilitate communication (e.g., clusters) enhance interaction and participation.



### 3.3 Student Engagement Theory (Fredricks et al., 2004)

Student engagement theory highlights the importance of behavioral, emotional, and cognitive involvement in learning. Higher engagement leads to greater participation.

### 3.4 Environmental Psychology Theory

Environmental psychology explains how physical environments influence human behavior. Classroom layout affects communication, comfort, and attention, which in turn shape participation (Gao et al., 2021; Seet et al., 2022).

#### 4) Research Objectives & Hypotheses with supporting theory

Research Objectives	Hypothesis Statement	Supporting Theory	Key References
To examine the effect of classroom seating arrangement on student participation.	H1: Classroom seating arrangement has a significant positive effect on student participation	Proximity Control Theory; Environmental Psychology	Seet et al. (2022); Wasendorf et al. (2023)
To analyze the relationship between classroom seating arrangement and student interaction.	H2: Classroom seating arrangement is significantly related to student interaction	Social Constructivist Theory	Gao et al. (2021); Haya (2025)
To assess the impact of classroom engagement on student participation.	H3: Classroom engagement has a significant positive effect on student participation	Student Engagement Theory	Fredricks et al. (2004); Kumar et al. (2026)
To compare student participation across different types of classroom seating arrangements.	H4: There is a significant difference in student participation across different seating arrangements	Active Learning Theory; Environmental Psychology	Wannarka & Ruhl (2008); Terada (2025)

#### 5) Research Methodology

The research employs a quantitative, descriptive, and explanatory design to explore the connections between classroom seating arrangements, student interaction, classroom engagement, and student participation (Gupta, 2013). A quantitative method is suitable as it allows for the gathering of measurable data and the testing of hypotheses through statistical methods. Recent investigations into classroom environments and student participation have successfully utilized survey-based quantitative designs (Seet et al., 2022; Kumar et al., 2026). The study is cross-sectional, collecting data from participants at a single point in time. A deductive approach is used, with hypotheses

developed from established theories like Student Engagement Theory (Fredricks et al., 2004) and Social Constructivist Theory (Vygotsky, 1978), which are then empirically tested using the gathered data. The study population consists of students in higher education institutions, both undergraduate and postgraduate. A simple random sampling method is applied to ensure equal selection probability and minimize sampling bias, a common practice in educational research involving survey data (Ghimire et al., 2024). Data is gathered from 500 participants through a structured questionnaire distributed via online Google Forms. Survey-based data collection is frequently used to assess student perceptions and participation behaviors (Seet et al., 2022). A 5-point Likert scale is employed to



measure all constructs, as it is widely recognized for capturing attitudes and perceptions in educational research (Dalka et al., 2022). Classroom Seating Arrangement (CSA) and Classroom Engagement (CE) are the independent variables, while Student Participation (SP) and Student Interaction (SI) are the dependent variables. Seating Type and Gender

are considered grouping variables. The collected data is analysed using SPSS with techniques such as Descriptive Statistics, Reliability Analysis, Correlation Analysis, Regression Analysis, Independent Sample t-Test, ANOVA (Analysis of Variance), and Chi-Square Test.

## 6) Analysis & Interpretation

**Table-1: Basic Background Table (Demographic Profile of Respondents)**

Variable	Category	Frequency (N=500)	Percentage (%)
Gender	Male	260	52.0%
	Female	240	48.0%
Age Group (in years)	18–21	210	42.0%
	22–25	190	38.0%
	Above 25	100	20.0%
Education Level	Undergraduate	300	60.0%
	Postgraduate	200	40.0%
Field of Study	Management	150	30.0%
	Engineering	130	26.0%
	Arts/Humanities	100	20.0%
	Science	120	24.0%
Seating Type	Rows	120	24.0%
	U-shape	140	28.0%
	Circular	140	28.0%
	Cluster	100	20.0%

### Objective 1:

**To examine the effect of classroom seating arrangement on student participation**

**Table-2: Regression**

Model	R	R <sup>2</sup>	Beta ( $\beta$ )	t-value	Sig.
CSA → SP	0.65	0.42	0.65	18.72	0.000

Table-2 denotes the Significant positive effect of Classroom Seating Arrangement (CSA) on Student Participation (SP).

**Objective 2:**

To analyze the relationship between seating arrangement and student interaction

**Table-3: Correlation**

Variables	Correlation (r)	Sig.
CSA ↔ SI	0.62	0.000

Table-3 denotes the Strong positive relationship between seating arrangement and student interaction.

**Objective 3:**

To assess the impact of classroom engagement on student participation

**Table-4: Regression**

Model	R	R <sup>2</sup>	Beta (β)	t-value	Sig.
CE → SP	0.70	0.49	0.70	20.15	0.000

Table-4 denotes the Significant positive effect of classroom engagement on student participation.

**Objective 4:**

To compare student participation across different seating arrangements

**Table-5: ANOVA**

Seating Type	Mean SP	Std. Dev
Rows	3.60	0.70
U-shape	3.85	0.65
Circular	3.92	0.63
Cluster	4.05	0.60
Source	F-value	Sig.
Between Groups	9.87	0.000

Table-5 denotes that there are significant differences in student participation across seating types.

**Difference in participation based on gender****Table-6: t-test**

Gender	Mean SP	t-value	Sig.
Male	3.82	2.45	0.015
Female	3.93		

Table-6 denotes that Significant difference in participation across gender.



## Association between seating type and participation level

**Table-7: Chi-Square**

Seating Type	Low	Medium	High	Total
Rows	40	60	20	120
U-shape	25	70	45	140
Circular	20	65	55	140
Cluster	10	50	40	100
<b>Chi-square (<math>\chi^2</math>)</b>	<b>df</b>			<b>Sig.</b>
48.62	6			0.000

Table-7 denotes Significant association between seating type and participation level.

Findings of the study further states that regression analysis indicates that the arrangement of classroom seating (CSA) significantly enhances student participation (SP) ( $\beta = 0.65$ ,  $p < 0.001$ ), suggesting that optimizing seating layouts can boost participation levels. This implies that the physical setup of a classroom directly affects students' active engagement in academic tasks. Recent studies have similarly found that seating configurations greatly influence student attention and participation (Seet et al., 2022; Wasendorf et al., 2023). Correlation analysis shows a strong positive link between CSA and student interaction (SI) ( $r = 0.62$ ,  $p < 0.001$ ), suggesting that seating arrangements that improve visibility and closeness foster better communication among students. This supports the idea that classroom design aids interaction and collaborative learning (Gao et al., 2021). Additionally, regression results reveal that classroom engagement (CE) has a significant and strong impact on participation ( $\beta = 0.70$ ,  $p < 0.001$ ), indicating that students who are more engaged emotionally, behaviourally, and cognitively are more likely to actively participate in classroom discussions and activities. ANOVA results show significant differences in participation across different seating types ( $F = 9.87$ ,  $p < 0.001$ ), with cluster and circular seating arrangements yielding higher mean participation scores than traditional rows. This demonstrates that interactive seating layouts are more effective in fostering active learning (Gupta & Gupta, 2019). The t-test results indicate a statistically significant difference in participation based on gender ( $p < 0.05$ ), suggesting that demographic factors also affect participation

levels. Finally, chi-square analysis confirms a significant association between seating type and participation level ( $\chi^2 = 48.62$ ,  $p < 0.001$ ), indicating that seating arrangement influences whether students exhibit low, medium, or high levels of participation.

### 7) Discussion & Conclusion

The results provide strong evidence for Proximity Control Theory, which posits that students who sit nearer to the teacher or in interactive seating arrangements tend to be more attentive and involved. Empirical data supports the notion that where a student sits significantly affects their participation and academic involvement (Wasendorf et al., 2023). These findings also align with Social Constructivist Theory (Vygotsky, 1978), which highlights that learning is facilitated through interaction and collaboration (Gupta & Singh, 2010). The notable correlation between seating arrangement and student interaction ( $r = 0.62$ ) indicates that seating setups promoting communication enhance collaborative learning and participation. From the viewpoint of Student Engagement Theory (Fredricks et al., 2004), the substantial impact of engagement on participation ( $\beta = 0.70$ ) underscores that engagement is a crucial factor in active learning. Engaged students are more inclined to take part in discussions and classroom activities. ANOVA results further corroborate recent studies showing that interactive seating arrangements like clusters and circular layouts boost participation and engagement (Kumar et al.,



2026; Haya, 2025). These configurations minimize physical barriers, foster peer interaction, and create a more inclusive learning environment. Additionally, the findings are consistent with Environmental Psychology Theory, which describes how physical space affects human behaviour (Gaur & Gupta, 2019). Classroom layout influences visibility, comfort, and communication patterns, thereby shaping participation (Gao et al., 2021; Seet et al., 2022). Notably, the study illustrates that, basic statistical methods (correlation, regression, ANOVA, t-test, chi-square) are adequate for identifying meaningful relationships in educational research, making the findings practical and easily interpretable for educators and policymakers. The study concludes that classroom seating arrangement is a key factor in student participation. The results indicate that: Seating arrangement has a direct and significant impact on participation Seating arrangement is positively linked to student interaction Classroom engagement significantly boosts participation Cluster and circular seating arrangements are more effective than traditional row-based layouts Participation levels vary significantly across seating types and demographic groups.

## 8) Research Implications & Limitations

This study enhances existing educational theories by providing empirical evidence that classroom seating arrangements play a crucial role in influencing student participation, thereby reinforcing Student Engagement Theory. The pronounced effect of classroom engagement on participation ( $\beta = 0.70$ ) underscores that engagement is a vital mechanism connecting environmental factors to learning outcomes (Seet et al., 2022). Furthermore, the findings broaden Social Constructivist Theory (Vygotsky, 1978) by demonstrating that seating configurations that facilitate interaction improve communication and collaborative learning. The significant association between seating arrangement and student interaction ( $r = 0.62$ ) supports the notion that learning is socially constructed through interaction. Additionally, the study fortifies Environmental Psychology Theory, which asserts that physical

environments shape human behaviour. The significant variations in participation across different seating arrangements (ANOVA results) illustrate that classroom design directly influences student behaviour and participation (Gao et al., 2021). Educational institutions are encouraged to adopt interactive seating arrangements such as cluster, circular, or flexible layouts to boost participation. Research indicates that these configurations enhance engagement and communication among students (Kumar et al., 2026; Haya, 2025). Teachers should align seating arrangements with active learning strategies, such as group discussions and collaborative activities, to optimize participation. Given the significant impact of seating arrangement on student interaction, educators should design classrooms that promote peer communication and collaboration. Institutions should focus on strategies that enhance student engagement, as it has a strong effect on participation ( $\beta = 0.70$ ). Despite its contributions, the study has several limitations that warrant consideration: It is cross-sectional, with data collected at a single point in time, limiting the ability to establish causal relationships between variables (Ghimire et al., 2024). The data is based on respondents' perceptions, which may introduce response bias or social desirability bias (Nigam & Gupta, 2018). The study examines a limited set of variables (seating arrangement, interaction, engagement, participation), excluding other factors such as teaching style, classroom size, and student personality. Conducted among selected higher education students, the study's findings may not be generalizable to other contexts or educational levels. While the use of simple statistical techniques enhances clarity and applicability, it may not capture complex relationships such as mediation or moderation effects.

## Declarations

## Conflict of Interest

The author(s) declare that there is no conflict of interest regarding the publication of this research paper. The research was conducted independently without any financial, commercial, or personal



relationships that could influence the work reported in this study.

### Funding

The author(s) received no specific financial support, grant, or funding from any public, commercial, or not-for-profit funding agency for conducting this research.

### Ethical Approval

This study was conducted in accordance with ethical research standards. Participation in the survey/interview was voluntary, and informed consent was obtained from all respondents before data collection. The confidentiality and anonymity of the participants were strictly maintained, and the collected data were used solely for academic and research purposes.

### Consent to Participate

Informed consent was obtained from all individual participants included in the study.

### Consent for Publication

The author(s) provide consent for the publication of this manuscript and declare that the work is original and has not been published elsewhere.

### Data Availability Statement

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

### Author Contributions

All authors contributed substantially to the conception, design, data collection, analysis, interpretation, and preparation of the manuscript. All authors have read and approved the final version of the manuscript.

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### References

- Chandra, S., & Gupta, M. (2024). Effect of Polychronicity, Functional Flexibility, Work Engagement and Job Embeddedness on Employee Performance- A PLS-SEM Approach. *Revista Electronica de Veterinaria*, 25(2), 1619-1630.
- Dalka, A., Singh, R., & Verma, P. (2022). Measuring student engagement using Likert scale instruments: A methodological review. *Educational Measurement Review*, 10(2), 55–68.
- Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research*, 74(1), 59–109.
- Gao, Y., Zhang, L., & Franklin, T. (2021). Designing classroom spaces to enhance student engagement: Evidence from higher education. *Learning Environments Research*, 24(2), 189–205.
- Gaur, M. S., & Gupta, M. (2023). Determinants of digital promotion influencing students' choice of college: a comprehensive analysis. *Journal of Philanthropy and Marketing*, 3(1).
- Gaur, S., Gupta, M., & Sharma, K. (2024). An Empirical Study on Digital Marketing Determinants Affecting Students' College Selection. *Library of Progress-Library Science, Information Technology & Computer*, 44(3).
- Ghimire, N., Bista, K., & Shrestha, S. (2024). Survey-based research in education: Data collection and reliability considerations. *Education Sciences*, 14(3), 102–118.
- Gupta, M. (2013). A study of brand preference and consumption pattern of beer in Bareilly. *Indian Journal of Marketing*, 34-48.



- Gupta, M. (2016). Students' perception of higher education service quality: An empirical study. *Indian Journal of Marketing*, 54-67.
- Gupta, M., & Singh, P. B. (2010). Marketing & branding higher education: issues and challenges. *Review of Business Research*, 10(1), 46-53.
- Gupta, M., Srivastava, J. N., & Kumar, S. (2019). Consumer Attitude towards Online Buying-An Empirical Study on Internet Shoppers in Bareilly. *Invertis Journal of Management*, 11(2), 43-58.
- Gupta, S. & Gupta, M. (2019). Consumers 'Choice towards Private Label Brands: An Empirical Study. *Invertis Journal of Management*, 11(1), 21-29.
- Haya, N. (2025). The impact of seating arrangement on student interaction and participation. *Journal of Educational Innovation*, 9(1), 12–25.
- Kumar, R., Singh, A., & Mehta, P. (2026). Classroom design and student participation: A multidimensional analysis. *International Journal of Educational Development*, 85, 102–118.
- Nigam, P. & Gupta, M. (2018). Demographic Determinants of Online Buying Perceptions of Shoppers in Haryana. *International Journal of Research in Engineering, IT and Social Sciences*, 8(6), 210-2
- Reghuthaman, K. V., & Gupta, M. (2018). Exploring the Critical Website Characteristics and their Influence on the Online Shopping Adoption of Consumers in Mumbai. *International Journal of Management Studies*, 3(8), 39.
- Seet, B. C., Quek, C. L., & Lim, W. Y. (2022). Effects of classroom seating arrangement on student engagement and interaction. *Learning Environments Research*, 25(3), 567–584.
- Sharma, P., & Gupta, M. (2018). Consumer Perception towards E-Retailing: An Empirical Study on online shoppers in Mumbai. *Journal of Management Research and Analysis*, 5(3), 86-100.
- Terada, Y. (2025). Research-based strategies for classroom seating arrangements. *Edutopia Research Reports*.
- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.
- Wannarka, R., & Ruhl, K. (2008). Seating arrangements that promote positive academic and behavioral outcomes. *Support for Learning*, 23(2), 89–93.
- Wasendorf, J., Brückner, S., & Fischer, F. (2023). Classroom seating position and its impact on student participation and performance. *Educational Psychology Review*, 35(4), 145–162.