Influence of Classroom Management on Intermediate Level Students' Academic Achievements in Aligarh District of Uttar Pradesh in India

Tariq Zubair[1], Uzma Qazi[2]
[1]Assistant Professor, Department of Management, Jazan University, Saudi Arabia
[2]Lecturer, College of Arts and Humanities, Jazan University, Saudi Arabia

Abstract:
This study investigates the impact of classroom management on student academic achievement at the intermediate level in Aligarh District, Uttar Pradesh, India, using Structural Equation Modeling-Partial Least Squares (SEM-PLS). A sample of 383 intermediate-level teachers was randomly selected, and student achievement data were obtained from final-year graduates. The study aims to assess the relationships between key classroom management factors—such as classroom rules, discipline methods, reward systems, and the teaching-learning process—and their influence on academic performance. SEM-PLS was employed to analyze the hypothesized model, evaluate the structural relationships between the variables, and validate measurement indicators. The results show a strong positive relationship between effective classroom management and student achievement. Key factors such as well-defined classroom rules, effective discipline, and reward systems were found to significantly influence student engagement and academic success. The model fit indices confirm the robustness of the proposed relationships. This research highlights the importance of structured classroom management in fostering student achievement and provides a comprehensive understanding of how classroom directives, rewards, and disciplinary methods contribute to learning outcomes. The findings suggest potential pathways for educational improvements and recommend further research to explore these dynamics across different educational settings using SEM-PLS.

Keywords: Classroom management, student achievement, SEM-PLS, rewards, discipline.

Introduction:
Academic achievement of students are dependent on several factors. However, students attitude towards the learning process is the most impactful factor at school as those with positive attitude tend to have a promising grade and vice versa [1]. Student's attitude during learning process needs to be changed due to some of the following reasons: 1) It will be directly related to achievement, as the better the attitude they possess, the more exceptional grade they probably obtain in the class. 2) Students with good attitude have a more significant probability of deepening and learning knowledge by themselves. 3) Attitude is often been communicated with other people, especially friends at the same age as it tends to affect their psychology of learning [2]. An important factor in a student's academic achievement and general growth in classroom management. A well-run classroom closely correlates with the effectiveness and caliber of the instructor. Main goal of good classroom management is to maintain students' active and productive participation in the teaching-learning process. The classroom is the place where the teacher interacts with the students. The way and extent to which a teacher exercises authority, demonstrates love and support, fosters teamwork, and tolerates individual freedom of choice and decision-making, all shape the atmosphere in the classroom. It is the teacher's choice to manage the classroom effectively and ineffectively [3]. Classroom climate, expectations, motivations, and methods for constructive reflection on mistakes are investigated to support teachers in developing a positive learning environment [4]. Positive behaviors are emphasized in the

classroom in order to support students' teaching-learning process. It encompasses all the tasks required to create and preserved a well-organized learning environment, including organizing, planning and preparing resources, and establishing guidelines and norms [5].

The level of teacher student interaction, the suitability of learning environment and learning commitment provide significant contribution towards learning comfort [6]. Effective classroom management gives students the chance to engage in real-world interactions as a component of their education. Effective classroom management, to start with, requires both innovative education and preventive control from the teacher's point of view.

In Aligarh District of Uttar Pradesh, India, many educational institutions encounter issues such as packed classrooms, inadequate infrastructure, and low parental involvement. It has long been understood that good classroom management is essential to the teaching-learning process. It comprises the teaching-learning process, incentives and sanctions in addition to efficient classroom regulations. In order to maintain effective control, it is crucial for novice teachers to acquire the abilities of classroom management. Some believes that establishing the rules for the classroom on the first day encourages discipline and regularity among the pupils. It has been noted that the majority of teachers lack basic knowledge regarding classroom management, which could put them in a challenging scenario. The teaching-learning process, classroom norms, and classroom administration are not well understood. The study, therefore, focused on the impact of classroom management on the achievement level of students' at intermediate level in Aligarh District of Uttar Pradesh, India.

Research Objectives:
The influence of classroom management, including rules, rewards and discipline, on students' achievement levels at the intermediate level in Aligarh district of Uttar Pradesh, India were the main focus of the study.

Research Hypotheses:
H1: Classroom Rules has a significant impact on Student Achievement Level

H2: Discipline Methods has a significant impact on Student Achievement Level

H3: Rewards System has a significant impact on Student Achievement Level

H4: Teaching-Learning Process has a significant impact on Student Achievement Level

Significance of the study:
The study will support the supervisory management, which is a crucial facet of the administration of education. The government has implemented the number of programs and steps to strengthen the role of oversight plays in efficient management. The principal of the intermediate college has the supervisory responsibility of monitoring how the teaching-learning process is carried out in the classroom. An ongoing source of contention in the classroom setting has always been classroom management. The only person with the authority to keep the classroom in order is the teacher. An essential component of the teaching-learning process is classroom management. It changes the way the students' are seated, the lesson plan, the rules in the classroom, the system of rewards and discipline, and the teaching-learning process itself. Additionally, the study is important for novice teachers. Respecting the classroom rule makes it easier to administer the classroom effectively, which raises student's accomplishment levels. Effective classroom management creates an environment where students can succeed at a higher level. The problem has been effectively addressed, producing some extremely important findings and conclusions that could assist the administration, policy makers and educational management in implementing practical measures for efficient classroom management.

Literature Review
In a study it has been identified that there is a strong and positive relationship between classroom discipline, effective teaching, use of a classroom reward system and student academic performance and a significant and moderate relationship between use of delegation of authority in the classroom and student academic performance[7].

In a study it has been examined whether teacher-perceived student need for behavior support plans through classroom management training program called as CHAMPS, which stands for Conversation, Help, Activity, Movement, Participation and Success on student's outcome. They concluded that students in CHAMPS classrooms who were identified by teachers would have greater end-of-year improvements on behavior and academic outcomes relative to comparable youth in non-CHAMPS classrooms.[8]

Some studies have concluded that textbooks are essential tools for teachers in teaching-learning process. It is not the sole educational resource available. Teachers utilizes certain resources found in textbooks. Instead, students must complete the entire book. Teachers are able to modify the textbooks to meet the need of individual students when the content is not appropriate for their skill level or interests. Teachers look for additional learning resources on the internet, in magazines, journals, newspapers, research articles, and other relevant resources with the need of time[9].

Several research experiments examined the effects of perceptions of students about classroom learning environment on their academic achievement by using Classroom Environment Instrument (Personal Form) to measure the students' perceptions on the basis of analyzed data using multiple regression, Pearson r and ANOVA and revealed that the subscales, 'Involvement, Personal relevance, Emphasis on understanding' were major predictors contributing towards classroom learning environment and students' academic achievement whereas subscales, 'Investigation & Autonomy' have negative effect on students' academic achievement[10].

It has been stated that students need to confront their own abilities. It ought to be the foundation of their mental capacities. For students, achievement and attainment take center stage as a result of an enhanced balance between the stimulation of cognitive motivation and the experience of achievement. Reinforcing successful learning helps learners feel more motivated and eager to learn. It lessens the possibility that students will have a bad attitude about the instruction. Teachers can use the content that will stimulates students' cognitive abilities to illustrate how successful their students are. Students must work harder to become proficient and enhance their performance[11].

According to one statement body language is one strategy that educators can employ to reduce unacceptable behavior. Educators should employ prepared approaches to maintain his/ her attitude. Teachers might use this to prevent disruptive conduct and keep lessons running smoothly. As a result, nonverbal communication reinforces learners who are distracted, negligent, or unmotivated[12].

Research Methodology
The study's research approach is quantitative, which includes the use of questionnaires, assessments and the examination of academic data [13]. This methodology is consistent with the goal of the study, which is to conduct a complete assessment of how sustainability policies in educational institutions affect the academic performance of the students. Explanatory research methodology is used in quantitative research with the goal of elucidating the relationships and interactions between various variables. The cross-sectional system used in this study [14] allows data to be collected at one time from a large number of students within Aligarh, Uttar Pradesh academic institutions. Student's primary data is collected using a self-administered Google form questionnaire and personal contacts. According to study data analysis includes the use of both descriptive and inferential methodologies, with descriptive analysis providing a broad overview of the data. In contrast, inferential analysis enables the exploration of important connections and patterns across variables, ultimately leading to a comprehensive understanding of how sustainable practices affect academic attainment.[15]

Data Collection
The study focuses on students currently enrolled in Aligarh, Uttar Pradesh academic institutions, which constitutes a diverse and complicated educational environment. A stratified random sampling technique[16] ensures a comprehensive and equal representation of this student population. The stratification divides students based on significant characteristics such as educational attainment, gender, and academic department. The use of stratified random sampling[17] is motivated by the need to reduce any biases that may arise from plain random sampling. The study's goal is to divide the population into subgroups to account for student diversity and to ensure that the sample is reflective of the diverse student body in

Aligarh, Uttar Pradesh academic institutions. This methodology's justification is based on its capacity to give an accurate and unbiased assessment of population characteristics and variable relationships[18]. Furthermore, it improve the study's external validity by allowing for generalization from the sample of the larger student population[19]. This methodology techniques provides for a more thorough analysis of the research questions and objectives, boosting study's overall dependability and precision. The study used stratification to guarantee that different student groups were represented proportionally in the sample, which improved the reliability and accuracy of the findings.

The quantitative data were gathered using the stratified random sampling approach. The survey data generates rich, nuanced perspectives, and this method allows for a more comprehensive and full comprehension of the research topic.

The decision to collect data from two government colleges and three private colleges in Aligarh, Uttar Pradesh was prompted by a desire to have a comprehensive knowledge of the academic landscape. When compared to private colleges, public colleges usually exhibits distinguishing characteristics, including resource allocation, curriculum structure and funding sources. By including both types of facilities, the study may provide a more thorough assessment of the impact of sustainability measures on students' academic performance in Aligarh, Uttar Pradesh. A study proposed that the minimum sample size for Partial Least Squares Structural Equation Modelling (PLS-SEM) be ten times the largest number of structural paths oriented toward a certain construct in the structural model[20]. However, earlier research [21] [22] suggests that increasing the sample size can improve the statistical power, precision, consistency, and reliability of PLS-SEM estimations[23]. Study revealed that Partial Least Squares Structural Equation Modelling performs well when applied to dataset with large sample size. The questionnaire was distributed to 500 respondents, but only 383 replies were obtained, which were included in the study[24].

Data Source

1. Academic Records

The study's major source of information was academic achievement statistics, which included Grades and Grades Points Averages (GPAs). Data were collected from participating colleges in Aligarh, Uttar Pradesh, which included both state and private colleges. These quantitative indicators objectively assessed students' performance in their particular courses, offering a thorough and unbiased evaluation of their academic progress. By analysing academic records, the study was able to determine the measurable impact of sustainable behaviours of students' academic achievement, laying a solid foundation for the conclusions.

2. Questionnaires

Questionnaires[25] investigated the element that mediate and influence the association between sustainable behaviour and academic success. These surveys are designed to examine students' tendency for sustainability, psychological empowerment, and perspectives on the digital learning environment at educational institution[26]. The survey was conducted with students utilizing Google Forms self-administered questionnaire and personal contacts. To eliminate bias, the survey begin with a target of 500 respondents drawn at random. After thorough data cleansing, 383 completed surveys were deemed eligible for the study. This strategy generated a reliable and representative dataset for evaluating higher education IT-sustainability integration. The study aim to improve our understanding of the impact of sustainable behaviours on academic achievements by looking into students' motives, viewpoints, and feelings of empowerment. Surveys are important study tools because they comprehensively explore the relationship between sustainable practices, students attitudes and educational outcome[27]. These surveys are designed to use Likert-Five Point Scale Questions, which allows for methodical data analysis and measurement of responses[28]. The study used a convergent mixed-method methodology[29], combining academic records and survey data to thoroughly investigate the nuanced relationships between sustainable behaviours and academic achievement in the Aligarh, Uttar Pradesh educational system.
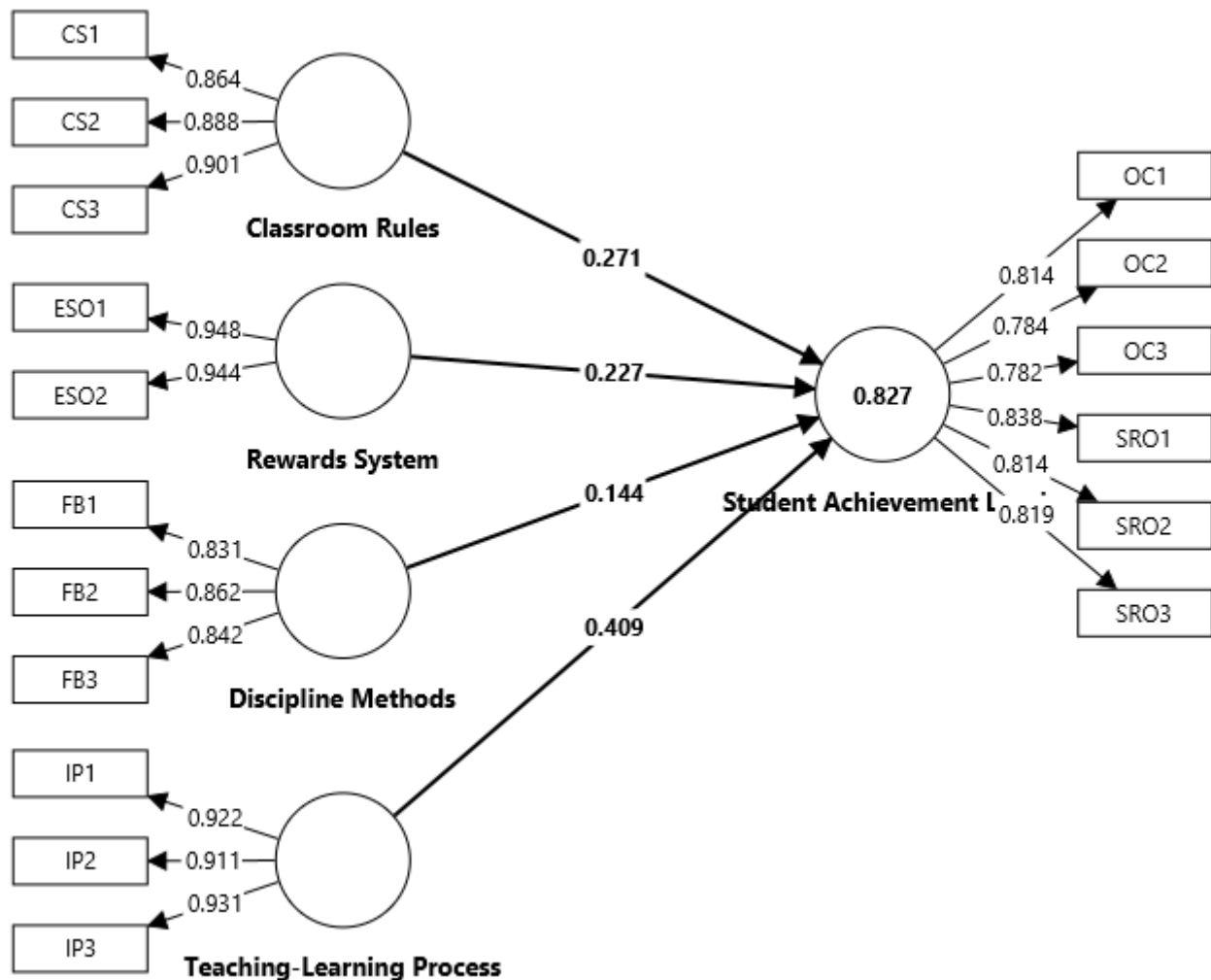
Data Analysis

Measurement Model

Figure 1: Measurement Model

Construct Reliability

Table 1: Construct Reliability assesses the internal consistency of the measurement constructs used in the study. This table presents reliability coefficients such as **Cronbach's alpha** and **Composite Reliability (CR)**, which indicate the extent to which the items within each construct consistently measure the same underlying concept. A Cronbach's alpha and CR value above 0.7 generally indicates good reliability, ensuring the constructs used are valid for further analysis.

Table 1: Construct Reliability

Constructs	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Classroom Rules	0.860	0.861	0.915	0.782
Discipline Methods	0.805	0.836	0.882	0.714
Rewards System	0.882	0.883	0.944	0.894
Student Achievement Level	0.894	0.895	0.919	0.654

Teaching-Learning Process	0.911	0.915	0.944	0.849

According to the construct reliability results, every measuring concept applied in the research shows strong internal consistency and validity. Exceeding the recommended threshold of 0.7, Cronbach's alpha scores for all constructions range from 0.805 to 0.911, indicating that the items within each construct are regularly assessing the same underlying notion. Furthermore, with values ranging from 0.883 to 0.944, the composite reliability values (rho_a and rho_c) are also considerably above the recommended threshold of 0.7, hence confirming the validity of these constructions in expressing the intended theoretical concepts. Furthermore confirming strong convergent validity, the Average Variance Extracted (AVE) values for all constructions above the 0.5 thresholds and range from 0.654 to 0.894. This proves that the underlying indicators of each construct explain a significant fraction of their variance, so verifying the validity and dependability of the constructions for the next structural investigation.

Discriminant Validity

Table 2: Discriminant Validity indicates how distinct each construct is. The square root of the Average Variance Extracted (AVE) for each construct is compared to the construct correlations to measure this. Good discriminant validity means a construct's square root of AVE is greater than its correlations with other constructs, indicating that it measures a unique notion.

Table 2: Discriminant Validity

Constructs	Classroom Rules	Discipline Methods	Rewards System	Student Achievement Level	Teaching-Learning Process
Classroom Rules	0.884	-	-	-	-
Discipline Methods	0.644	0.845	-	-	-
Rewards System	0.561	0.588	0.946	-	-
Student Achievement Level	0.798	0.696	0.728	0.809	-
Teaching-Learning Process	0.753	0.598	0.647	0.846	0.921

Every item in the study is separate and represents different aspects of classroom management, rewards, and student accomplishment; this is confirmed by the discriminant validity of the constructs, which were evaluated using the Fornell-Larcker criterion. Each construct's square root of the Average Variance Extracted (AVE) must be greater than the correlations between them to meet this condition. Here, every single structure satisfies this criterion. Take Classroom Rules as an example. Its square root of AVE (0.884) is higher than its correlations with other constructs, such as Discipline Methods (0.644) and Rewards System (0.561). Values of 0.845 for Discipline Methods, 0.946 for the Rewards System, 0.809 for Student Achievement Level, and 0.921 for the Teaching-Learning Process all surpass the correlations with other variables. This proves the model's great discriminant validity by showing how each concept is distinct from the others. The results show that the constructs measure different aspects of student accomplishment and classroom management, which proves that the measurement model is accurate and reliable.

Table 3: R-Square and Effect Size (f-Square) Values

Constructs	R-square	R-square adjusted	f-square
Student Achievement Level	0.827	0.825	-
Classroom Rules -> Student Achievement Level	-	-	0.159

Discipline Methods -> Student Achievement Level	-	-	0.061
Rewards System -> Student Achievement Level	-	-	0.154
Teaching-Learning Process -> Student Achievement Level	-	-	0.344

R-Square and Effect Size (f-Square) Values

Table 3: With the R-square value for Student achievements Level of 0.827, the model—which incorporates the constructions of Classroom Rules, Discipline Methods, Reward System, and Teaching-Learning Process—indicates that around 82.7% of the variance in student achievement can be explained by it. Since the modified R-square value of 0.825 considers the number of predictors in the model while preserving a high degree of explanatory power, it strengthens even more the resilience of the model. Regarding effect sizes expressed by the f-square values, the study exposes different degrees of influence among the independent factors on student performance. With a 0.344 effect size, the Teaching-Learning Process is shown to be the most likely to influence student success levels. This suggests that changes in the teaching-learning environment will probably produce considerable increases in student results. After that, Classroom Rules (f-square = 0.159) and Rewards System (f-square = 0.154) show modest impacts, meaning that although to a smaller degree than the teaching-learning process, both construct favourably to student achievement. Finally, Discipline Methods (f-square = 0.061) exhibits the smallest impact size, implying its comparatively minor influence on student performance among the other variables. These findings highlight the need of the teaching-learning process generally and the need of classroom regulations and rewards in improving student academic performance.
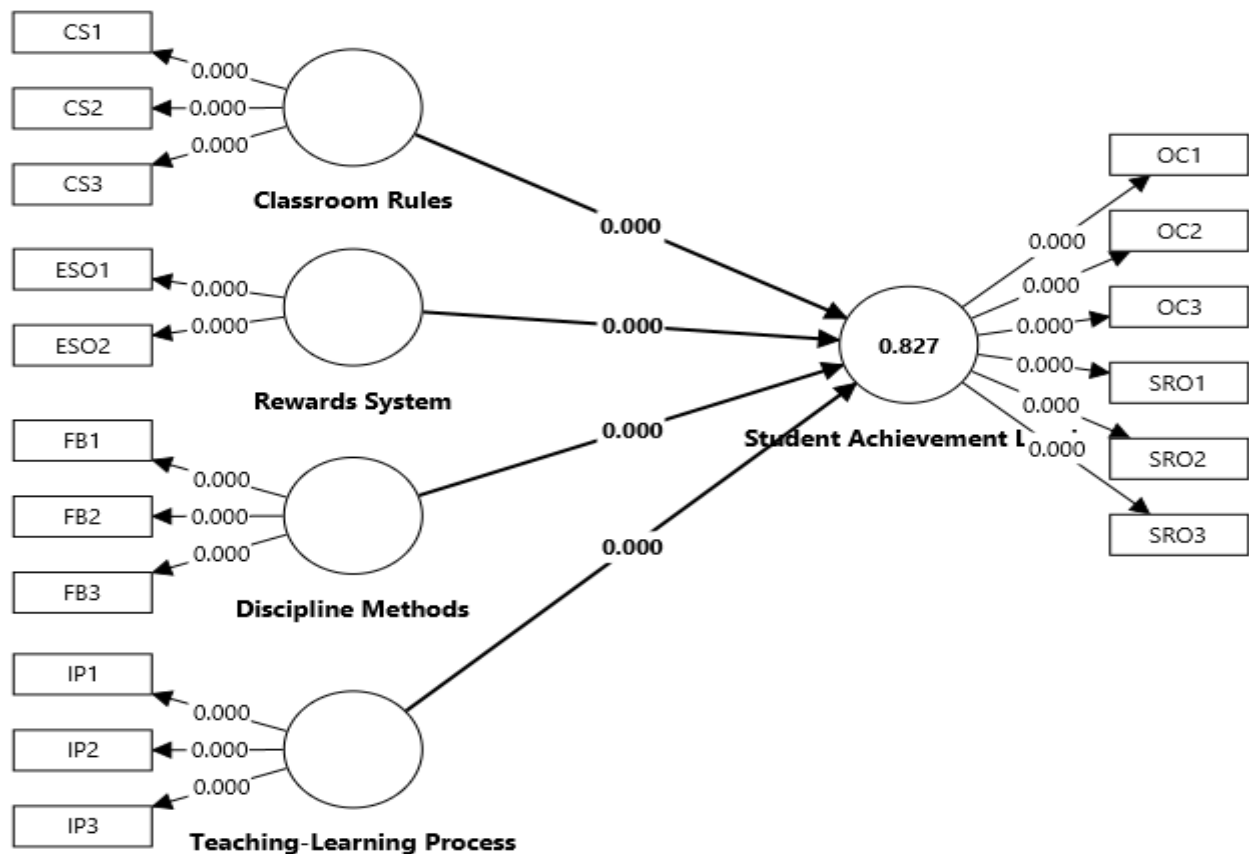
Structural Model

Figure 2: Structural Model

Hypothesis testing shows in **Table 4** that classroom management constructs affect student achievement. Significant route coefficients indicate that effective classroom rules, discipline procedures, reward systems, and teaching-learning processes improve student achievement. The results support the premise that classroom management improves academic performance.

Table 4: Hypothesis Testing

Hypothesis	Path	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values	Remarks
H1	Classroom Rules -> Student Achievement Level	0.271	0.27	0.036	7.422	0.000	Supported
H2	Discipline Methods -> Student Achievement Level	0.144	0.144	0.033	4.366	0.000	Supported
H3	Rewards System -> Student Achievement Level	0.227	0.226	0.035	6.527	0.000	Supported
H4	Teaching-Learning Process -> Student Achievement Level	0.409	0.41	0.041	9.951	0.000	Supported

The results of the hypothesis testing, as shown in Table 4, indicate strong support for all proposed hypotheses regarding the impact of various classroom management constructs on student achievement levels.

Hypothesis H1 suggests a positive relationship between **Classroom Rules** and **Student Achievement Level**, with a path coefficient of **0.271** and a T-statistic of **7.422**, which is statistically significant ($p < 0.001$). This indicates that well-defined classroom rules significantly enhance student academic performance.

Hypothesis H2 posits that **Discipline Methods** positively influence **Student Achievement Level**. The path coefficient of **0.144** and a T-statistic of **4.366** further confirm this relationship, reinforcing the importance of effective discipline strategies in the classroom ($p < 0.001$).

Hypothesis H3 examines the effect of the **Rewards System** on **Student Achievement Level**, yielding a path coefficient of **0.227** and a T-statistic of **6.527**. This significant finding indicates that a well-implemented rewards system can positively affect student performance ($p < 0.001$).

Hypothesis H4 investigates the **Teaching-Learning Process**, demonstrating the most substantial effect with a path coefficient of **0.409** and a T-statistic of **9.951**. This strong and significant result underscores the crucial role of a conducive teaching-learning environment in enhancing student achievement levels ($p < 0.001$).

Discussion

The results of the study are somewhat consistent with the body of knowledge already in publication regarding the importance of classroom environment in determining student performance. Table 4 shows that all four suggested hypotheses—those of Classroom Rules, Discipline Strategies, Rewards System, and Teaching-Learning Process—were validated, so implying that constructs like these greatly affect student's academic performance. Previous studies have underlined in particular how basic classroom rules are for creating a good learning environment. Analysis claims that student performance is positively correlated with a methodical strategy of classroom discipline[7]. The result of the present study, with a path

coefficient of 0.271 and a T-statistic of 7.422, supports this claim by implying that well defined and regularly implemented policies improve student involvement and focus, which are essential for academic achievement. Similarly, the favourable impact of Discipline Methods on student accomplishment (path coefficient of 0.144, T-statistic of 4.366) supports[8], who underlined the need of behaviour support techniques in enhancing academic outcomes. Good disciplinary techniques not only help to create a good classroom environment but also let students participate in learning free from more distractions, hence improving performance. The results of the study on the Rewards System (path coefficient of 0.227, T-statistic of 6.527) reflect the opinions of who addressed the need of intrinsic and extrinsic motivators in the classroom[10],. The great influence of a well-run rewards system implies that acknowledging and rewarding good behaviour can greatly inspire students, therefore improving their academic performance. Furthermore, the findings on the Teaching-Learning Process (path coefficient of 0.409, T-statistic of 9.951) underline its central influence in determining student performance. This result is in line with studies which noted that a supportive learning environment and successful teaching strategies inspire student performance and motivation[30]. The present research emphasises that an interesting and dynamic teaching-learning process not only improves knowledge retention but also fosters a good attitude towards learning, therefore supporting academic performance.

Conclusion

With all factors considered, the information in this study offers empirical validation for the theoretical models covered in the literature. Improving student accomplishment levels depends on well-defined rules, efficient discipline measures, a strong rewards system, and an interesting teaching-learning process including classroom management techniques. These results not only add to the body of knowledge already in use but also have pragmatic ramifications for teachers and legislators trying to improve the quality of instruction in classrooms, especially in demanding settings like those found in Aligarh District of Uttar Pradesh. The study emphasises the requirement of continuous professional development for teachers to equip them with the tools required for efficient classroom management, therefore enabling an environment where children may flourish academically.

Recommendations

Since the study has proved that classroom management is the vital part of the teaching-learning process and assist the teacher in maintaining discipline in the classroom.

1. The college administration may guarantee that the classroom regulations are appropriately framed, organized and explained on the first day of the class.

2. As expected, the teacher may remain in the classroom.

3. All classroom teachers should be required to display the classroom rules in their classrooms.

4. Since physical punishment has been prohibited, effective classroom management can be used to regulate disruptive behavior.

5. A productive teaching-learning process may assure classroom norms and discipline.

References:

1. W. Lawsha, M. & Hussain, "Secondary Students' Attitude towards Mathematics in a Selected School of Maldives," *Int. J. Humanit. Soc. Sci.*, vol. 1, no. 15, 2011.
2. X. Bi, "Associations between psychosocial aspects of English classroom environments and motivation types of Chinese tertiary-level English majors," *Learn. Environ. Res.*, vol. 18, no. 1, 2015, doi: 10.1007/s10984-015-9177-2.
3. E. S.-P. Bulbin Socuoglu, Selma Akalin, "The Effects of Classroom Management on the Behaviors of Students with Disabilities in Inclusive Classrooms in Turkey," *J. Int. Assoc. Spec. Educ.*, vol. 11, no. 1, 2010.
4. K. Sieberer-Nagler, "Effective Classroom-Management & Positive Teaching," *English Lang. Teach.*, vol. 9, no. 1, 2015, doi: 10.5539/elt.v9n1p163.
5. B. T. Afalla and F. L. Fabelico, "SUSTAINING ACADEMIC SUCCESS THROUGH EFFECTIVE

CLASSROOM MANAGEMENT," *Humanit. Soc. Sci. Rev.*, vol. 8, no. 4, 2020, doi: 10.18510/hssr.2020.8422.

6. C. N. Che Ahmad, S. A. Shaharim, and M. F. N. L. Abdullah, "Teacher-student interactions, learning commitment, learning environment and their relationship with student learning comfort," *J. Turkish Sci. Educ.*, vol. 14, no. 1, 2017, doi: 10.12973/tused.10190a.

7. A.-O. Ebimiere, N. J. Uloaku, & Nweke, and E. Onyekachi, "CLASSROOM MANAGEMENT AND STUDENTS ACADEMIC PERFORMANCE IN PUBLIC SECONDARY SCHOOLS IN RIVERS STATE," 2020.

8. J. Sinclair, K. C. Herman, W. M. Reinke, N. Dong, and M. Stormont, "Effects of a Universal Classroom Management Intervention on Middle School Students With or At Risk of Behavior Problems," *Remedial Spec. Educ.*, vol. 42, no. 1, 2021, doi: 10.1177/0741932520926610.

9. S. R. Self-brown and S. Mathews, "Effects of classroom structure on student achievement goal orientation," *J. Educ. Res.*, vol. 97, no. 2, 2003, doi: 10.1080/00220670309597513.

10. R. H. Malik and A. Rizvi, "Effect of Classroom Learning Environment on Students' Academic Achievement in Mathematics at Secondary Level," *Bull. Educ. Res.*, vol. 40, no. 2, 2018.

11. S. B. Flory, C. Nieman, and R. C. Wylie, "Facilitating culturally responsive teaching in PETE alumni: a mixed methods analysis," *Curric. Stud. Heal. Phys. Educ.*, vol. 15, no. 1, 2024, doi: 10.1080/25742981.2023.2208566.

12. M. Kunter, J. Baumert, and O. Köller, "Effective classroom management and the development of subject-related interest," *Learn. Instr.*, vol. 17, no. 5, 2007, doi: 10.1016/j.learninstruc.2007.09.002.

13. M. Sandelowski, "Focus on research methods: Combining qualitative and quantitative sampling, data collection, and analysis techniques in mixed-method studies," *Res. Nurs. Heal.*, vol. 23, no. 3, 2000, doi: 10.1002/1098-240x(200006)23:3<246::aid-nur9>3.0.co;2-h.

14. J. Zangirolami-Raimundo, J. de O. Echeimberg, and C. Leone, "Research methodology topics: Cross-sectional studies," *J. Hum. Growth Dev.*, vol. 28, no. 3, 2018, doi: 10.7322/jhgd.152198.

15. A. Al-Aufi and H. Al-Azri, "Information literacy in Oman's higher education: A descriptive-inferential approach," *J. Librariansh. Inf. Sci.*, vol. 45, no. 4, 2013, doi: 10.1177/0961000613486824.

16. A. Singh and M. Masuku, "Sampling Techniques & Determination of Sample Size in Applied Statistics Research: an Overview," *Ijecm.Co.Uk*, vol. II, no. 11, 2014.

17. T. D. Nguyen, M. H. Shih, D. Srivastava, S. Tirthapura, and B. Xu, "Stratified random sampling from streaming and stored data," *Distrib. Parallel Databases*, vol. 39, no. 3, 2021, doi: 10.1007/s10619-020-07315-w.

18. T. Zaman, "An efficient exponential estimator of the mean under stratified random sampling," *Math. Popul. Stud.*, vol. 28, no. 2, 2021, doi: 10.1080/08898480.2020.1767420.

19. C. R. Howell, W. Su, A. F. Nassel, A. A. Agne, and A. L. Cherrington, "Area based stratified random sampling using geospatial technology in a community-based survey," *BMC Public Health*, vol. 20, no. 1, 2020, doi: 10.1186/s12889-020-09793-0.

20. A. Leguina, "A primer on partial least squares structural equation modeling (PLS-SEM)," *Int. J. Res. Method Educ.*, vol. 38, no. 2, 2015, doi: 10.1080/1743727x.2015.1005806.

21. C. Barroso, G. C. Carrión, and J. L. Roldán, "Applying Maximum Likelihood and PLS on Different Sample Sizes: Studies on SERVQUAL Model and Employee Behavior Model," in *Handbook of Partial Least Squares*, 2010. doi: 10.1007/978-3-540-32827-8_20.

22. S. Benzidia, N. Makaoui, and O. Bentahar, "The impact of big data analytics and artificial intelligence on green supply chain process integration and hospital environmental performance," *Technol. Forecast. Soc. Change*, vol. 165, 2021, doi: 10.1016/j.techfore.2020.120557.

23. J. F. Hair, J. J. Risher, M. Sarstedt, and C. M. Ringle, "When to use and how to report the results of PLS-SEM," 2019. doi: 10.1108/EBR-11-2018-0203.

24. M. Sabol, J. Hair, G. Cepeda, J. L. Roldán, and A. Y. L. Chong, "PLS-SEM in information systems: seizing the opportunity and marching ahead full speed to adopt methodological updates," 2023. doi: 10.1108/IMDS-07-2023-0429.

25. J. Rowley, "Designing and using research questionnaires," *Manag. Res. Rev.*, vol. 37, no. 3, 2014, doi: 10.1108/MRR-02-2013-0027.

26. J. C. F. Ho and M. Z. Yao, "Sequence analysis in distributed interactive learning environments:

Visualization and clustering of exploratory behavior," *J. Educ. Online*, vol. 15, no. 2, 2018, doi: 10.9743/jeo.2018.15.2.10.

27. V. Braun, V. Clarke, E. Boulton, L. Davey, and C. McEvoy, "The online survey as a qualitative research tool," *Int. J. Soc. Res. Methodol.*, vol. 24, no. 6, 2021, doi: 10.1080/13645579.2020.1805550.

28. S. McLeod, "Likert Scale Definition, Examples and Analysis," *Simply Psychol.*, 2019.

29. E. Weyant, "Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, 5th Edition," *J. Electron. Resour. Med. Libr.*, vol. 19, no. 1–2, 2022, doi: 10.1080/15424065.2022.2046231.

30. C. M. Ateh and L. B. Ryan, "Preparing teacher candidates to be culturally responsive in classroom management," *Soc. Sci. Humanit. Open*, vol. 7, no. 1, 2023, doi: 10.1016/j.ssaho.2023.100455.