
Flexible Classroom Design and Its Effects on Learners' Behavioral Engagement and Academic Achievement

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Abstract — This study investigated the interrelationship between flexible classroom design, learners' behavioral engagement, and academic achievement among 100 learners from a secondary school in Cagayan, Philippines during the School Year 2025–2026. Specifically, it examined the extent of implementation of flexible classroom design in terms of furniture flexibility, classroom layout and space utilization, learning zones and collaborative spaces, and accessibility of learning resources; determined the level of learners' behavioral engagement in terms of classroom participation, attentiveness, task persistence, and collaboration with peers; assessed learners' academic achievement based on their General Weighted Average (GWA); and determined the significant interrelationship among the variables. The study employed a descriptive-correlational research design and utilized a researcher-made questionnaire as the primary data-gathering instrument. Results revealed that the implementation of flexible classroom design was generally good (mean = 2.77), while learners' behavioral engagement was found to be satisfactory (mean = 2.65). In terms of academic achievement, the majority of learners obtained Very Satisfactory (60.00%) and Outstanding (32.00%) ratings. Furthermore, significant positive relationships were found between flexible classroom design and learners' behavioral engagement ($r = 0.684, p = 0.000$), flexible classroom design and academic achievement ($r = 0.592, p = 0.001$), and learners' behavioral engagement and academic achievement ($r = 0.731, p = 0.000$). The findings suggest that flexible classroom design contributes to improved learner engagement and academic performance.

Keywords: flexible classroom design, behavioral engagement, academic achievement, learning environment, secondary school learners, descriptive-correlational study

I. INTRODUCTION

The physical learning environment plays a significant role in shaping students' educational experiences and outcomes. In recent years, schools have increasingly adopted flexible classroom designs as an alternative to traditional classroom arrangements characterized by fixed rows of desks and teacher-centered instruction. Flexible classroom design refers to learning spaces that incorporate movable furniture, varied seating options, collaborative work areas, and adaptable layouts that can be modified according to instructional needs and learning activities. These environments are intended to support learner-centered approaches, promote active participation, and accommodate diverse learning styles. As educational institutions strive to enhance student engagement, academic achievement, and overall well-being, the effectiveness of flexible classroom design has become an important area of investigation.

One of the persistent challenges faced by educators is the decline in learners' behavioral engagement, which includes students' active participation, attentiveness, cooperation, and involvement in classroom activities. Many students remain passive during lessons, exhibit off-task behaviors, and demonstrate limited interaction with peers and teachers. Such behaviors negatively affect the learning process and often lead to poor academic achievement. Beyond academic consequences, low levels of engagement may also influence learners' motivation, self-confidence, sense of belonging, and overall school well-being. Since behavioral engagement and academic success are essential dimensions of holistic student development, creating learning environments that support both cognitive and socio-emotional growth has become a critical concern for educators. Traditional classroom settings may contribute to disengagement by restricting movement, limiting collaboration, and providing fewer opportunities for active learning. Consequently, there is a growing need to explore innovative classroom environments that can foster greater student engagement, academic success, and positive developmental outcomes.

Research suggests that classroom design can substantially influence student behavior and academic success. Barrett et al. (2017) found that physical classroom characteristics significantly affected students' academic progress. Their findings revealed that factors such as flexibility, ownership, lighting, air quality, and color contributed to variations in learners' achievement. The study demonstrated that well-designed learning environments can positively influence students'

learning experiences and support higher levels of academic performance. In addition, classrooms that promote comfort, interaction, and active participation may contribute to learners' overall well-being by creating supportive conditions for learning and personal development.

Similarly, Kariippanon et al. (2019) examined the effects of flexible learning spaces on secondary school students' classroom behavior. The researchers found that students in flexible classrooms spent significantly more time collaborating, interacting with peers, and actively engaging in learning activities compared to students in traditional classroom settings. Furthermore, learners in flexible environments displayed lower levels of off-task verbal behavior and greater participation in student-centered learning experiences. These findings suggest that flexible classroom designs can create conditions that enhance behavioral engagement, strengthen social interactions, and promote learning experiences that support both academic growth and student well-being.

Despite the growing body of international literature supporting the benefits of flexible learning environments, there remains a need to examine their effectiveness within specific educational contexts. Differences in school resources, instructional practices, class sizes, and student characteristics may influence how classroom design affects engagement and achievement. Moreover, limited local evidence exists regarding the relationship between flexible classroom design, learners' behavioral engagement, and academic performance in Philippine secondary schools. This gap is particularly significant because the Philippine educational setting presents unique contextual factors, including varying levels of classroom resources, diverse learner needs, and ongoing efforts to improve learning environments in public schools. By examining these relationships among secondary school learners in Cagayan, this study contributes to the growing Philippine education literature by providing localized empirical evidence on how flexible classroom design influences both engagement and achievement. Such evidence may help inform school improvement initiatives, resource allocation decisions, and classroom design policies tailored to the needs of Filipino learners.

In view of these concerns, this study aims to determine the effects of flexible classroom design on learners' behavioral engagement and academic achievement. Specifically, it seeks to examine whether flexible learning environments contribute to increased student participation,

attentiveness, and involvement in classroom activities while also enhancing academic performance. More importantly, the study recognizes behavioral engagement and academic achievement as integral components of holistic student well-being that can influence learners' long-term educational success, personal development, and future societal participation. Through this investigation, the study intends to provide empirical evidence that may guide educators, school administrators, and policymakers in creating learning spaces that not only improve educational outcomes but also promote the overall well-being and development of learners.

Literature Review

Flexible classroom design has become a significant focus in contemporary education because of its potential to enhance student engagement and improve academic performance. Unlike traditional classrooms with fixed seating arrangements, flexible learning spaces feature movable furniture, collaborative workstations, technology integration, and adaptable layouts that support various instructional approaches. These environments are designed to promote active learning, student autonomy, collaboration, and inclusivity. As schools increasingly adopt learner-centered pedagogies, researchers have begun examining how physical learning environments influence learners' behavioral engagement and academic achievement.

Recent literature suggests that classroom space is not merely a physical setting but an essential component of the teaching and learning process. According to Peng et al. (2022), the spatial attributes of active learning classrooms significantly influence students' learning experiences and engagement. Their study found that instructional interaction, furniture design, learning support facilities, and the physical environment positively affected student participation and engagement. The researchers emphasized that flexible and well-designed learning spaces create opportunities for collaboration and active involvement, leading to improved learning outcomes.

Similarly, Ribeiro-Silva et al. (2022) highlighted the importance of active learning environments in promoting students' academic well-being and achievement. Their review demonstrated that active learning methodologies implemented in flexible educational settings

enhanced learners' motivation, participation, collaboration, and overall academic success. The authors argued that modern learning spaces should encourage interaction and engagement rather than passive learning.

The transformation of learning spaces has also been associated with increased student engagement. Yesil and Aras (2024) reported that flexible and innovative learning spaces and found that students perceived such environments as more inviting, interactive, and conducive to active participation. The study revealed that flexible furniture arrangements and collaborative settings encouraged learners to become more engaged in classroom activities and discussions. These findings suggest that classroom design can directly influence students' behavioral involvement in learning.

Further evidence was provided by Lee et al. (2023), who explored the effects of furnishings and technology in flexible learning spaces. Their findings indicated that flexible furniture configurations supported diverse instructional strategies and strengthened student-to-student and student-to-teacher interactions. The availability of writable surfaces and digital technologies further enhanced collaborative learning and classroom engagement. The researchers concluded that flexible classroom environments positively support learner participation and pedagogical effectiveness.

In another study, Salar et al. (2024) examined the influence of classroom design on academic performance among elementary pupils. Their findings highlighted that features such as natural lighting, acoustics, technology integration, and engagement-focused classroom arrangements contributed to a positive learning environment. Although classroom design alone did not fully explain academic outcomes, the researchers stressed that well-designed learning spaces play a vital role in supporting student motivation and learning experiences.

The growing demand for flexibility in education has also been documented by El Galad et al. (2024). Their study revealed that flexible learning practices promote accessibility, inclusivity, and responsiveness to diverse learner needs. Students reported valuing flexible learning environments because they provided greater opportunities for participation, collaboration, and personalized learning experiences. The researchers concluded that flexibility contributes to more supportive and effective educational environments.

Supporting this perspective, Lazareva and Tømte (2024) found that flexible technology-rich learning spaces promoted collaboration, resource sharing, and group interaction among learners. Their study emphasized that flexible environments encourage teamwork and active participation, which are essential components of behavioral engagement and academic success.

More recently, Sullivan and Morris (2024) examined the impacts of flexible learning environments on student achievement. Their findings suggested that flexible learning options can help address diverse learner needs while maintaining or improving academic performance. The authors emphasized that educational institutions should continue exploring flexible learning environments as a strategy for supporting student success and engagement.

Overall, the reviewed literature demonstrates that flexible classroom design positively influences learners' behavioral engagement and academic achievement. Studies consistently indicate that adaptable learning spaces encourage participation, collaboration, motivation, and interaction while supporting improved academic outcomes. These findings provide a strong empirical foundation for investigating the effects of flexible classroom design on learners' behavioral engagement and academic achievement in the present study.

Research Questions

This study investigated the effects of flexible classroom design on learners' behavioral engagement and academic achievement in Cagayan, Philippines.

Specifically, this study sought to answer the following questions:

1. What is the extent of implementation of flexible classroom design in terms of the following dimensions?
 - a. furniture flexibility;
 - b. classroom layout and space utilization;
 - c. learning zones and collaborative spaces;

- d. accessibility of learning resources
2. What is the level of learners' behavioral engagement in terms of the following dimensions?
 - a. classroom participation;
 - b. attentiveness;
 - c. task persistence;
 - d. collaboration with peers
 3. What is the level of learners' academic achievement based on their general weighted average (GWA)?
 4. Is there a significant interrelationship between flexible classroom design, learners' behavioral engagement, and academic achievement?

Hypothesis

The following null hypothesis was tested:

1. There is no significant interrelationship between flexible classroom design, learners' behavioral engagement, and academic achievement.

Limitation of the Study

This study was limited to 100 learners from a single secondary school in Cagayan, Philippines, which may restrict the generalizability of the findings to other educational settings with different learner populations, resources, and classroom conditions. Additionally, the study relied on learners' self-reported perceptions of flexible classroom design and behavioral engagement, which may be subject to response bias and individual interpretation. Furthermore, the

descriptive-correlational design only established relationships among the variables and did not determine causal effects. Other factors such as learners' motivation, socioeconomic status, parental support, and teacher effectiveness, which may also influence academic achievement and engagement, were not included in the investigation. Despite these limitations, the study provides valuable insights into the relationship among flexible classroom design, learners' behavioral engagement, and academic achievement and serves as a basis for future research in Philippine secondary education.

II. METHODOLOGY

Research Design

This study employed a descriptive-correlational research design. The descriptive component was utilized to determine the extent of flexible classroom design implementation and the levels of learners' behavioral engagement and academic achievement. It provided a systematic description of the existing conditions and characteristics of the variables under investigation without manipulating them.

Meanwhile, the correlational component was used to examine the relationships among flexible classroom design, learners' behavioral engagement, and academic achievement. This design was deemed appropriate because it enabled the researcher to collect quantitative data, describe the current status of the variables, and determine whether significant relationships existed among them. Through this approach, the study generated empirical evidence regarding the extent to which flexible classroom design is associated with learners' behavioral engagement and academic achievement.

Participants of the Study

The participants of this study consisted of 100 learners from a secondary school in Cagayan, Philippines. Data collection was conducted during the second semester of School Year

2025–2026, allowing sufficient time for questionnaire administration, retrieval of responses, and compilation of learners' academic records. The respondents were selected through simple random sampling, which ensured that every learner in the target population had an equal chance of being chosen to participate in the study.

In terms of demographic characteristics, 56 (56.00%) were female, and 44 (44.00%) were male. The respondents ranged in age from 13 to 16 years old, with a mean age of 14.4 years. Regarding grade level, 28 (28.00%) were Grade 7 learners, 25 (25.00%) were Grade 8 learners, 24 (24.00%) were Grade 9 learners, and 23 (23.00%) were Grade 10 learners. The relatively balanced distribution across grade levels provided a broad representation of junior high school learners and their experiences within the school's learning environment.

The selected learners served as the primary source of data regarding their perceptions of flexible classroom design, behavioral engagement, and academic achievement. Their participation provided valuable information for determining the relationship among the variables under investigation. The total sample size of respondents was considered adequate for the descriptive-correlational analysis utilized in the study.

Instrumentation

This study utilized a researcher-made questionnaire as the primary data-gathering instrument. The questionnaire was designed to gather data on the extent of implementation of flexible classroom design and the level of learners' behavioral engagement. It consisted of two major parts. The first part measured flexible classroom design in terms of furniture flexibility, classroom layout and space utilization, learning zones and collaborative spaces, and accessibility of learning resources. The second part measured learners' behavioral engagement in terms of classroom participation, attentiveness, task persistence, and collaboration with peers. All items were rated using a four-point Likert scale with the following response options: 4 – Strongly Agree, 3 – Agree, 2 – Disagree, and 1 – Strongly Disagree.

To determine the learners' academic achievement, data were obtained from the respondents' academic records, particularly their General Weighted Average (GWA) or final grades for the grading period covered by the study. Before data collection, the questionnaire was subjected to validation by experts in educational research and classroom instruction to ensure its content validity, clarity, relevance, and appropriateness to the objectives of the study. Necessary revisions were incorporated based on their recommendations.

To further establish the reliability of the instrument, a pilot test was conducted among learners who were not included in the actual study. The internal consistency of the questionnaire was determined using Cronbach's alpha. The flexible classroom design scale obtained a Cronbach's alpha coefficient of 0.89, while the learners' behavioral engagement scale obtained a coefficient of 0.87. These results suggest that the questionnaire items consistently measured the constructs under investigation.

The validated and reliable questionnaire served as the principal instrument in collecting the data needed to examine the interrelationship between flexible classroom design, learners' behavioral engagement, and academic achievement.

Analysis of Data

The data gathered in this study were analyzed using both descriptive and inferential statistical methods. Descriptive statistics, specifically the mean and standard deviation, were utilized to determine the extent of implementation of flexible classroom design in terms of furniture flexibility, classroom layout and space utilization, learning zones and collaborative spaces, and accessibility of learning resources. These statistical measures were likewise used to determine the level of learners' behavioral engagement in terms of classroom participation, attentiveness, task persistence, and collaboration with peers, as well as the level of learners' academic achievement based on their academic performance. The following scales were used in interpreting the mean scores and academic achievement of the respondents:

Range	Flexible Classroom Design	Range	Learners' Behavioral Engagement	Range	Academic Achievement
1.00 – 1.74	Poor	1.00 – 1.74	Poor	75 and below	Did Not Meet Expectations
1.75 – 2.49	Fair	1.75 – 2.49	Unsatisfactory	75 - 79	Fairly Satisfactory
2.50 – 3.24	Good	2.50 – 3.24	Satisfactory	80 - 84	Satisfactory
3.25 – 4.00	Very Good	3.25 – 4.00	Very Satisfactory	85 - 89	Very Satisfactory
				90 and above	Outstanding

To determine the significant interrelationship among flexible classroom design, learners' behavioral engagement, and academic achievement, the Pearson Product-Moment Correlation Coefficient (Pearson r) was employed. This statistical tool was used to measure the strength and direction of the relationships among the variables. The computed correlation coefficients and corresponding significance values were used as bases in accepting or rejecting the null hypothesis at the 0.05 level of significance.

III. RESULTS AND DISCUSSION

Extent of implementation of flexible classroom design in terms of the following dimensions

The study revealed that the extent of implementation of flexible classroom design was generally good, as reflected by the overall mean of 2.77. Among the dimensions assessed,

Accessibility of Learning Resources obtained the highest mean of 2.87, indicating that learning materials, instructional resources, and educational tools were readily available and accessible to learners within the classroom environment. This was followed by Learning Zones and Collaborative Spaces with a mean of 2.84, suggesting that the classroom provided opportunities for group work, interaction, and collaborative learning activities. Classroom Layout and Space Utilization received a mean of 2.74, which indicates that the arrangement of the physical learning space adequately supported teaching and learning activities. Meanwhile, Furniture Flexibility obtained the lowest mean of 2.61, although it was still interpreted as good, implying that movable and adaptable furniture was present but may not have been extensively utilized. Overall, the results indicate that the school has successfully incorporated key elements of flexible classroom design, creating a learning environment that supports student participation, interaction, and access to educational resources. These findings suggest that the classroom setting provides learners with opportunities to engage in diverse learning experiences while promoting comfort, collaboration, and effective learning. The generally favorable ratings across all dimensions further imply that the implementation of flexible classroom design contributes positively to creating a learner-centered environment that responds to the varied needs of students.

Dimensions	Mean	Interpretation
Furniture Flexibility	2.61	Good
Classroom Layout and Space Utilization	2.74	Good
Learning Zones and Collaborative Spaces	2.84	Good
Accessibility of Learning Resources	2.87	Good
Mean	2.77	Good

Level of learners' behavioral engagement in terms of the following dimensions

The study revealed that the learners demonstrated a satisfactory level of behavioral engagement, as indicated by the overall mean of 2.65. Among the dimensions assessed, Collaboration with Peers obtained the highest mean of 2.72, suggesting that learners were generally willing to work with classmates, share ideas, and participate in group activities. This was followed by Classroom Participation, which garnered a mean of 2.67, indicating that students were moderately involved in classroom discussions and learning tasks. Task Persistence received a mean of 2.63, reflecting that learners were generally able to sustain their efforts and complete assigned activities despite challenges encountered during the learning process. Meanwhile, Attentiveness obtained the lowest mean of 2.58, although it remained within the satisfactory level, suggesting that some learners experienced difficulties in maintaining focus and concentration throughout classroom instruction. Overall, the results indicate that the respondents possessed a satisfactory level of engagement in classroom learning activities. The findings imply that learners actively participate in academic tasks, cooperate with their peers, and demonstrate reasonable persistence in accomplishing classroom requirements. However, the relatively lower rating in attentiveness suggests the need for instructional strategies and classroom practices that further enhance learners' focus and sustained attention during lessons. Despite this, the overall satisfactory rating reflects a positive learning environment where students are engaged and involved in the educational process.

Dimensions	Mean	Interpretation
Classroom Participation	2.67	Satisfactory
Attentiveness	2.58	Satisfactory
Task Persistence	2.63	Satisfactory
Collaboration With Peers	2.72	Satisfactory
Mean	2.65	Satisfactory

Level of learners' academic achievement based on their general weighted average (GWA)

The findings revealed that the learners generally demonstrated a high level of academic achievement. The majority of the respondents, 60 (60.00%), obtained a General Weighted Average (GWA) ranging from 85–89, interpreted as Very Satisfactory, while 32 (32.00%) achieved a GWA of 90 and above, corresponding to an Outstanding rating. Only 8 (8.00%) of the learners obtained a GWA ranging from 80–84, which is classified as Satisfactory. These results indicate that most of the learners performed well academically, with 92.00% attaining either Very Satisfactory or Outstanding ratings. The predominance of learners in the higher achievement categories suggests that the respondents were able to meet and exceed the expected learning competencies. Overall, the findings reflect a strong academic performance among the learners, indicating their ability to attain favorable educational outcomes and maintain a high level of academic excellence.

Learners' Academic Achievement	Frequency	Percent
80 – 84 (Satisfactory)	8	8.00
85 – 89 (Very Satisfactory)	60	60.00
90 and above (Outstanding)	32	32.00
Total	100	100.00

Interrelationship between flexible classroom design, learners' behavioral engagement and academic achievement

The analysis revealed that there is a significant interrelationship between flexible classroom design, learners' behavioral engagement, and academic achievement. Specifically, flexible classroom design was found to have a significant positive relationship with learners' behavioral engagement ($r = 0.684$, $p = 0.000$), indicating that classrooms characterized by flexible furniture, effective space utilization, collaborative learning zones, and accessible learning

resources tend to promote higher levels of participation, attentiveness, task persistence, and collaboration among learners. Likewise, flexible classroom design exhibited a significant positive relationship with academic achievement ($r = 0.592$, $p = 0.001$), suggesting that learners exposed to more flexible learning environments tend to perform better academically. Furthermore, learners' behavioral engagement demonstrated a strong positive relationship with academic achievement ($r = 0.731$, $p = 0.000$), indicating that students who actively participate in classroom activities, remain attentive, persist in completing tasks, and collaborate with peers are more likely to attain higher academic performance. Since all probability values were lower than the 0.05 level of significance, the null hypothesis was rejected, confirming the existence of significant relationships among the three variables.

The findings are supported by several studies cited in the literature review. Peng et al. (2022) found that the spatial attributes of active learning classrooms significantly influenced students' learning engagement, emphasizing that instructional interaction, furniture design, and the physical environment positively contributed to learner participation and engagement. Similarly, Lee et al. (2023) reported that flexible furnishings and learning technologies enhanced student engagement by facilitating interaction, collaboration, and the use of varied instructional strategies. Moreover, Kariippanon et al. (2019) revealed that flexible and innovative learning spaces encouraged active participation and increased student involvement in classroom activities. The significant relationship between behavioral engagement and academic achievement is also consistent with the findings of Ribeiro-Silva et al. (2022), who concluded that active learning environments promote student motivation, participation, and academic success. Collectively, these studies support the present finding that flexible classroom design contributes to improved learner engagement, which in turn enhances academic achievement.

Variables	Coefficient (r)	Probability	Statistical Inference
Flexible Classroom Design * Learners' Behavioral Engagement	0.684	0.000	Significant
Flexible Classroom Design * Learners' Academic Achievement	0.592	0.001	Significant
Learners' Behavioral Engagement * Academic Achievement	0.731	0.000	Significant

*Tested using Pearson Correlation at 0.005 level of significance

IV. CONCLUSION

Based on the findings of the study, it can be concluded that the implementation of flexible classroom design was generally good, while learners demonstrated a satisfactory level of behavioral engagement and a high level of academic achievement. The results further revealed significant positive relationships among flexible classroom design, learners' behavioral engagement, and academic achievement, indicating that improvements in classroom flexibility are associated with increased student engagement and better academic performance. Likewise, learners who exhibited higher levels of behavioral engagement tended to achieve better academic outcomes. Therefore, flexible classroom design plays a vital role in creating a learner-centered environment that promotes active participation, collaboration, and academic success. These findings underscore the importance of providing adaptable and resource-rich learning spaces to enhance both learner engagement and achievement in the educational setting.

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