Mathematics Project Competition (2025/26) 數學專題習作比賽 (2025/26) Information Sheet資料頁				
Category 參賽組別	□* A組：初中習作　(Category A: Junior secondary project) ✔ B組：中一小型習作 (Category B: S1 mini-project)			
Title of Project 專題習作題目	A Mathematical Modelling for Evaluating Optimal Classroom Layout			
Name of School	Hong Kong Chinese Women's Club College			
學校名稱	香港中國婦女會中學			
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Team members 隊員		Name in English	中文姓名	Class 班別
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	2	TING HOI LOK	丁鎧樂	1A
	3	WU WEI CHENG	伍煒城	1A
	4			
	5			
	6			

* Please "✔" whichever is appropriate. 請在適用部分加上"✔"

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A Mathematical Modelling for Evaluating Optimal Classroom Layout

1. Introduction

Our classroom layout arranges the seats in a traditional grid pattern. All students face the whiteboard and focus on the teacher's instructions. Sitting in row and column every single day is so boring. Indeed, there are alternative and creative seating layouts such as butterfly layout (a double E shape) and horseshoes layout (a U shape). We are curious about which arrangement of seats is mathematically optimal for students. To ensure a fair comparison, we developed a mathematical model to score different classroom layouts based on 3 aspects: flexibility, visibility and safety. Flexibility means having sufficient space to sit comfortably and walk smoothly. Visibility means being able to view the whiteboard without turning your head significantly. Safety means being able to walk to the emergency exit in the shortest distance. This project will evaluate an optimal classroom layout for 34 students among 3 different designs by using our score weighting system.

5. Discussion and Improvement

We were surprised by the results. At first, we believed that the newly designed and creative seating arrangement, which looks modern and fun, would score higher than the original layout, which considers old-fashioned and boring. However, the results show that the flexibility and visibility of the original layout are significantly better than the others, while safety is basically the same. No matter how we adjust the weights of the 3 variables, the results are not greatly affected. We were also shocked by the poor visibility of seats facing windows or lockers, as we initially thought the viewing angle would be the same as usual or even better. After strictly following the definition and applying the formula, we realized this is the true magic of mathematics. It provides us with objective truth instead of just feelings. We suddenly understood why the traditional layout is commonly used and has a long history. It has been optimized and validated over time. On the other hand, we also understood why there are alternative classroom layouts. They may serve education purposes. Students may form group discussion and build strong connections with other classmates.

However, we can make improvements to the original classroom layout, as there are still 4 students sitting outside the optimal viewing area. If we slightly adjust the angle of the desks so that each student's natural line of sight is directly toward the midpoint of the whiteboard, or if the viewing angle (a) is less than 35˚, as shown in Figure 3, we can enhance visibility. This suggests that further studies could explore the best adjustments for desk angles in a classroom setting.

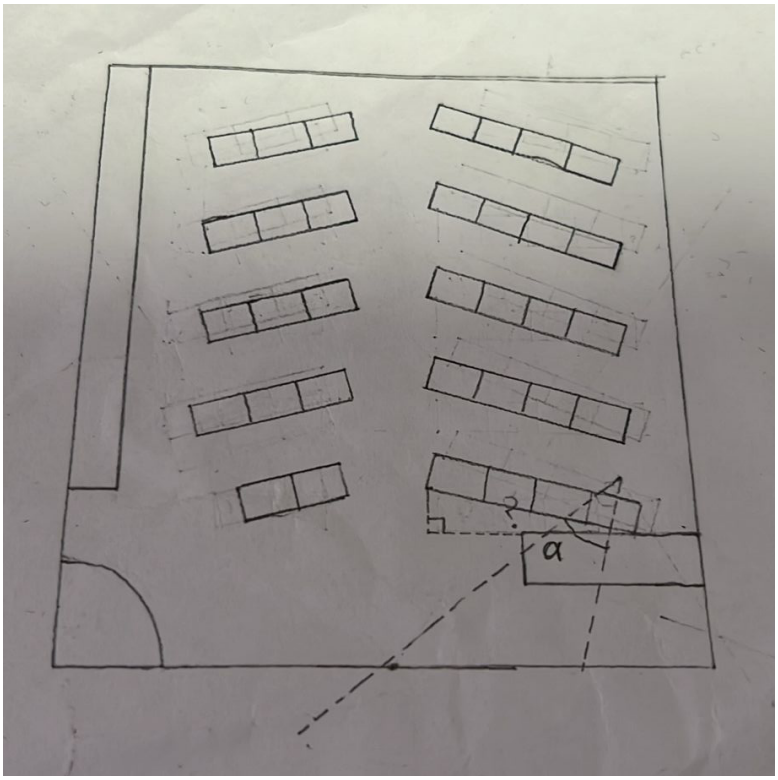

Figure 3

6. Reflection

This project was a profound lesson to us. It completely changed how we look at math, especially the process of building our own mathematical model. In normal classes, we usually just substitute numbers into a provided formula to find an answer. We used to wonder, 'Where do these formulas come from? What do these coefficients and constant actually mean in real life?' It felt like we were just following rules without knowing why the variables were connected. Building our own model forced us to think differently. Now, instead of just using a formula, we understand how to define the variables, discover the relationships between them, and create the formula ourselves. It made the math feel meaningful instead of just numbers on a page.

Finally, teamwork was crucial to our success. Over the past three months, we shared a huge workload and come up with much better ideas than we ever could on our own. We broke the big project down into smaller tasks, giving everyone a specific role in the design process. One of the smartest things we did was agree on a design style and made a template before we started our individual task so that we can ensure our work would be cohesive and easy to understand. As we delve deeper into the project, we feel more confident in our ability to analyze problems and seek meaningful solutions. It makes us excited to explore more about how math connects with the world around us.

7. Reference

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