

Task Design and Reflection

《課堂任務設計及反思》

1. Students' backgrounds and abilities:

學生的背景和能力：

Two groups of 33 students each from a Band 1 secondary school in a heterogeneous class. They possess above-average mathematical abilities and are eager to participate in learning activities.

2. Teaching Strategy: (Show how your task design meets the judging criteria)

教學策略：(作品如何配合評審標準)

Through the game of Greedy Bingo, students explore the concept that certain events are not equally likely and some events without a theoretical probability. This hands-on experience enhances their critical thinking skills related to uncertainty, thereby building a foundational understanding of basic probability concepts.

3. Content of Task Design:

任務設計內容：

Basic Information 基本資料		
Level 年級：	Secondary 3	Duration 時間：1 hour
Learning area 範疇：	Data Handling	Period 節數：1
Topic 課題：	Introduction to Probability	
Mode of teaching 課堂模式：	<input checked="" type="checkbox"/> Whole-class 全班教學 <input type="checkbox"/> Group work 分組教學 <input type="checkbox"/> Collaboration 協作教學	
Lesson objectives 教學目標：	1. Develop an understanding of event and sample space 2. Through the activity, students can perceive that some events are not equally likely 3. Through the accumulated experience, develop thinking skills related to uncertainty, laying the foundation for the preliminary concepts of probability. 4. Experience law of large number	
Anticipated Learning Difficulties 學生難點：	In textbooks, students typically handle questions with equally likely events and theoretical probability. They may, however, find it challenging when encountering unequally likely events and real-life situations without a theoretical probability in the game.	
Previous knowledge (if any) 已有知識(如有)：	N/A	
Teaching tools 教學資源：	Paper cups, dice, coins, Greedy Bingo activity sheet	

Presentation 教學計劃		
Stages / Time (mins) 教學程序及時間	Activities / Procedure 教學活動 / 程序	Materials 所需資源
Preparation before the lesson 課前預習	The rules of Greedy Bingo is delineated a lesson before for students to think about the “winning strategies” to the game. The instructions are as follows: <ul style="list-style-type: none"> • Fill the 16 boxes below with numbers from 1 to 20 according to your preference. Each number can be used a maximum of two times. • Players take turns choosing to roll a dice, toss a paper cup or toss a coin. A player can choose one, two or all three items. • After each turn, cross out the box corresponding to the score obtained from the 	

	<p>item(s) tossed.</p> <ul style="list-style-type: none"> The points obtained from the dice are equal to the number shown. For the paper cup, rolling on its side is worth 1 point, standing upright is worth 2 points, and being inverted is worth 2 points. Tossing a coin and getting heads is worth 1 point, while getting tails is worth 2 points. The player who first connects 4 lines wins! 	
Recap 重溫	Students are asked to share their thoughts on the game before engaging. They are then asked to fill out the Greedy Bingo activity sheet with numbers of their choice.	
Lead in 引起動機		
Development 發展 階段	<p>Distribute the activity worksheet and introduce the activity</p> <ul style="list-style-type: none"> Explain how to fill out the Bingo sheet with numbers from 1 to 20, emphasizing the maximum usage of each number. Describe the scoring system for the dice, cups, and coins. Clarify how to win by connecting 4 lines. <p>Playing Greedy Bingo (I)</p> <ul style="list-style-type: none"> Allow students to take turns rolling dice, tossing cups, and flipping coins. Instruct them to cross off numbers based on their scores. Monitor the groups, providing support and prompting discussions about strategies. <p>Class Discussion</p> <ul style="list-style-type: none"> Ask students to share which numbers they skipped and why. Discuss which numbers were not crossed off and the reasons. Encourage students to talk about their thoughts on which number was easiest to obtain. Discuss whether the chances of obtaining a 1 and a 2 are the same and solicit explanations. 	Paper cups, dice, coins, Greedy Bingo activity sheet
Application 應用階 段	<p>Playing Greedy Bingo (II)</p> <ul style="list-style-type: none"> Based on the class dialogue, students are asked to complete the four questions on the Greedy Bingo activity sheet. Students were then asked to play the game again, with their best strategies this time 	Paper cups, dice, coins, Greedy Bingo activity sheet
Conclusion 總結	<p>Summarize the take-away of the lesson.</p> <ul style="list-style-type: none"> Not all events are equally likely Later events may not be affected by or compensate for earlier ones As the number of trials increases, the average of the results is more likely to reflect the true probability distribution. This illustrates why it's improbable to get each number from 1 to 6 in just six dice throws, but over many more throws, the distribution of numbers will approximate expected probabilities. 	Greedy Bingo activity sheet

4. Students' Feedback 學生回應

During our classroom discussion, we explored four key questions:

1. **Which numbers did you skip in your Bingo? Why did you choose to skip those numbers?**

The majority of students opted to skip numbers that were 10 or greater. They reasoned that the probability of having numbers less than 10 was higher, thus making smaller numbers more likely to appear.

2. **Among the numbers you selected, which ones were not crossed away? What factors contributed to those numbers not being crossed off?**

Echoing the rationale of the first question, most students noted that numbers greater than or equal to 10

were less likely to be crossed off. Interestingly, some groups highlighted that middle-range numbers like 5 and 6 did not appear. I took the opportunity to clarify that higher probability does not guarantee occurrence, exemplifying that numbers 1, 2, 3, 4, 5, 6 are not guaranteed in six dice throws.

3. In your opinion, which number do you consider the easiest to obtain? Why?

Nearly all students immediately answered 1 is the easiest to obtain. They articulated that they have multiple ways to get 1. If they choose coins or paper cups, it is of high chance for them to get 1.

4. Are the chances of obtaining a 1 and a 2 the same? Please explain briefly.

Students consistently found that obtaining a 1 was easier than obtaining a 2. They noted that while both outcomes are possible with coins and paper cups, the structure of paper cups causing it often results in a 1 more frequently due to their tendency to roll onto one side.

The students provided positive feedback regarding the "Greedy Bingo" activity. Many found the game format engaging and enjoyable, which enhanced their interest in learning about probability. Students appreciated the hands-on experience, noting that it helped them better understand abstract concepts through real-life application. Students reported that the activity clarified their understanding of key probability concepts, particularly the idea that not all events are equally likely and the significance of repeated trials.

Overall, the feedback indicated that the activity was effective in making learning both enjoyable and educational, reinforcing their grasp of probability principles.

5. Teacher's Reflection 教學反思 (such as task design planning, students' progress and performance, etc.

如：教學計劃、學生進度、學生表現等)

The outcome and feedback from the activity exceeded my expectations, particularly in terms of students' engagement and their ability to connect mathematical concepts to real-life experiences. The integration of hands-on activities significantly increased student interest and motivation in participating in mathematics lessons. This experiential learning approach enabled students to actively construct knowledge, fostering deeper cognitive engagement.

Students demonstrated an enhanced ability to reflect on their experiences, utilizing metacognitive strategies to assess their understanding. The method of trial and error allowed them to formulate and verify conjectures, promoting a growth mindset and resilience in problem-solving. This pedagogical strategy not only facilitated conceptual understanding but also encouraged collaborative learning, as students discussed and refined their ideas in peer groups.

The game, including classroom dialogue, took one lesson to complete, which deviated from the planned teaching schedule. However, the students' increased interest and enhanced understanding of the topic demonstrated that this deviation was beneficial. I discovered that I didn't need to go through the textbook example by example. Students were able to grasp the chapter's concepts more quickly, allowing me to catch up with the teaching schedule.

This experience highlighted the efficacy of student-centered learning and active engagement strategies. By prioritizing guided inquiry-based learning, students developed critical thinking and problem-solving skills, which facilitated a deeper comprehension of mathematical concepts. The use of authentic tasks enabled learners to make meaningful connections between theoretical knowledge and practical application.

As a result, students demonstrated increased autonomy and confidence in their mathematical abilities. Reflecting on this lesson, it is evident that integrating dynamic, interactive elements into the curriculum not only aligns with educational best practices but also enhances overall student

S3 Mathematics
Introduction to Probability – Greedy Bingo

Name: _____

Class: _____ ()

Date: _____

Instructions

- Fill the 16 boxes below with numbers from 1 to 20 according to your preference. Each number can be used a maximum of two times.
- Players take turns choosing to roll a dice, toss a paper cup or toss a coin. A player can choose one, two or all three items.
- After each turn, cross out the box corresponding to the score obtained from the item(s) tossed.
- The points obtained from the dice are equal to the number shown. For the paper cup, rolling on its side is worth 1 point, standing upright is worth 2 points, and being inverted is worth 2 points. Tossing a coin and getting heads is worth 1 point, while getting tails is worth 2 points.
- The player who first connects 4 lines wins!

Bingo

Food for Thought

1. Which numbers did you skip in your Bingo? Why did you choose to skip those numbers?

2. Among the numbers you selected, which ones were not crossed away? What factors contributed to those numbers not being crossed off?

3. In your opinion, which number do you consider the easiest to obtain? Why?

4. Are the chances of obtaining a 1 and a 2 the same? Please explain briefly.

S3 Mathematics

Greedy Bingo

Introduction to Probability

Instructions

- Fill the 16 boxes below with numbers from 1 to 20.
- Players take turns choosing to roll a dice, toss a paper cup or toss a coin.



Points obtained are equal to the number shown



1 point

2 points



1 point



2 points

- The player who first connects 4 lines wins!

Trial

2	2	1	19
10	6	7	20
12	8	16	18
4	5	3	9

“

**Which numbers did you skip
in your Bingo?**

“

Among the numbers you
selected, which ones were not
crossed away?

“

**Which number do you
consider the easiest to obtain?**

“

Are the chances of obtaining a
1 and a 2 the same?