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以上一般為 40 分鐘的環節。注意部分環節的特別安排如下：

* 表示為 20 分鐘，

** 表示為 60 分鐘，

***表示為 80 分鐘，

數學詩展覽，作者會駐場與參觀者交流。

Unlocking the Full Potential of Graphical Display Calculators (GDCs) in Education

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Saint Joseph's Institution
IB MAA HL and SL Teacher, T^3 Asia Instructor
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For over 35 years, Texas Instruments' **Graphical Display Calculators (GDCs)** have been developed in collaboration with educators worldwide, making them a **revolutionary tool in mathematics education**. Approved for use in rigorous curricula such as the **IB Diploma Programme** and **Singapore-Cambridge GCE-A-Level**, GDCs help students tackle higher-order thinking problems — enhancing both teaching effectiveness and learning outcomes.

While GDCs are often associated with exams, their value extends far beyond assessments. Designed as an **all-in-one, distraction-free learning platform**, they remain unmatched in classroom practicality — even alongside modern devices like laptops and tablets. Through **dynamic visualization and computational tools**, GDCs simplify abstract concepts, empowering students to explore mathematics with deeper understanding.

Beyond core math skills, GDCs also bridge **STEM/STEAM education** through the **TI-Innovator system** and **Python programming**, fostering creativity and real-world problem-solving.

In this workshop, you'll discover how GDCs can:

- **Demystify complex concepts** through interactive graphing and visualization,
- **Enhance problem-solving** with powerful computational tools, and
- **Integrate STEM/STEAM** with hands-on programming and innovation projects.

Join us to explore how GDCs can **transform your classroom**—making learning more engaging, intuitive, and impactful!

Literature Review and Practical Insights on Mathematical Modelling in Primary Education

CHUI Ka Shing
Diocesan Boys' School Primary Division

Mathematical modelling has gained increasing attention in mathematics education as an essential approach to developing students' problem-solving and critical-thinking skills. Considering this, the Education Bureau (EDB) of Hong Kong has initiated the "Pilot Scheme on Introducing Mathematical Modelling to the Primary Mathematics Curriculum" to explore effective ways of integrating mathematical modelling into primary education.

This paper provides a literature review on the development and implementation of mathematical modelling in primary mathematics curricula worldwide, highlighting key pedagogical approaches, challenges, and best practices. Additionally, as a participant in the pilot scheme, the author will share firsthand experiences regarding the planning, implementation, and review of trial lessons conducted in a primary school setting. The discussion will focus on lesson design, student learning outcomes, and teacher reflections.

Furthermore, this paper aims to summarize the successful development of mathematical modelling in three key areas:

1. Curriculum integration – How mathematical modelling aligns with existing mathematics topics and enhances conceptual understanding.
2. Learning and teaching strategies – Effective instructional approaches and classroom practices that support students in engaging with mathematical modelling tasks.
3. Assessment methods – Evaluation techniques that capture students' modelling processes and reasoning.

As the EDB plans to embed mathematical modelling into both primary and secondary education in Hong Kong, this paper will provide practical insights for educators on how to effectively incorporate mathematical modelling into their teaching practices. By reflecting on the pilot scheme's experiences and global research findings, educators can better prepare for this upcoming curriculum transformation and enhance students' mathematical competencies in real-world problem-solving.

Can AI Coach Teachers?

HUI Chun Kong, KEI Kai Yi, LAU Tin Kong, CHOI Chun Hei
STFA Lee Shau Kee College

We were curious: Can AI coach teachers? In this sharing, we'll explore our personal journey of being coached by AI. We'll delve into the experience of crafting prompts and observing the Al's responses, essentially asking it to step into the role of a teacher coach. We'll share our firsthand feelings, reflections, and insights gained from this experiment. We may discuss the potential and limitations of using AI in teacher development, and consider what this means for the future of education. Ultimately, this sharing aims to spark a meaningful dialogue about how AI might change the way we support teachers.

Complementing Traditional Mathematics Classrooms with the Integration of AI Tools

KO Kwan Ngok
HKFYG Lee Shau Kee College
CHENG Wing Kin
Hong Kong Metropolitan University

The education sector is currently witnessing a growing acceptance and integration of Artificial Intelligence (AI) across various domains. While the potential of AI to revolutionize education is widely acknowledged, the industry is still in the process of actively exploring and defining its practical implementation both within traditional classroom settings and in broader learning environments. Lijia, Pingping and Zhijian (2020) have ascertained the leverage of diverse AI platforms and tools in administration, instruction, and learning can improve educators' effectiveness and students' learning experience. However, the actual usage and effectiveness in different educational contexts are areas of ongoing investigation and development, reflecting a phase of enthusiastic adoption coupled with pragmatic exploration. This essay examines the integration of AI in mathematics education, with a specific focus on how both mathematics-specific tools like Thetawise can assist teachers in creating exercises and other general AI tools can automate tasks through a 'no code' approach. Through a demonstrative approach, we illustrate the practical applications of these AI tools in streamlining mathematics teachers' workflows. Furthermore, drawing upon recent research, we discuss the crucial aspects of AI literacy required for educators to effectively utilize these technologies and their adoption in mathematics classrooms. Emphasizing the need for a balanced integration that complements traditional teaching methods, this paper contributes to the growing understanding of AI's potential to enhance efficiency and engagement in mathematics education while addressing general ethical considerations towards the end of the article.

Supporting Students' Spatial Reasoning Through Programming: A Quadratic Growth Case Study

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In the context of the rapidly evolving artificial intelligence era, educational researchers are actively promoting the integration of programming tools into the mathematics classroom. However, most studies usually focus on the impact of programming on mathematics learning outcomes and attitudes, and only few studies focus on how programming affects students' mathematical reasoning processes. This study aims to fill this gap by investigating how programming environments can help students understand the second difference of quadratic functions. A square growth task in a geometric context was designed to make the second difference more concrete. One seventh-grade student completed the task in two semi-structured interviews, one in a paper-based setting and the other using Scratch. This study used open coding to analyze the student's reasoning process. The findings suggest that, for the student in this study, the programming environment appeared to help restructure and optimize his spatial reasoning, enabling him to explicitly identify the source of the second difference. This study demonstrates the potential of programming as a technological tool to facilitate students' mathematical reasoning and informs how teachers can design function-related tasks in programming environments.

Comparison of van Hiele Levels of Geometric Thinking to the Cognitive Process Dimension of Revised Bloom's Taxonomy (RBT)

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The rapidly changing Information Age has made the development of higher-order thinking skills (HOTS) crucial to success in the 21st century. Hence, fostering students' HOTS is not only gaining more attention, but also considered to be the future direction for mathematics education. In fact, educators have always been interested in how students think in mathematics, especially geometry, given the importance of geometric thinking in the school mathematics curriculum. To some extent, familiarity with both the van Hiele model and Revised Bloom's Taxonomy (RBT) is vital for geometry teachers. The use of the van Hiele model on the levels of geometric thinking is utilized to explore students' understanding and their cognition of geometry. With reference to the cognitive process dimension of RBT, teachers can then accurately see at what stage students tend to use more high-level cognitive processes. Furthermore, there exist enough similarities between the cognitive process dimension of RBT and the van Hiele levels of geometric thinking; indeed, a comparison between these two theories is beneficial in assessing students' deep understanding of geometry. This paper firstly provides an overview of the van Hiele model and RBT. Finally, a comparative analysis is made between van Hiele levels of geometric thinking and the cognitive process dimension of RBT. It is hoped that this paper will pave the way for future research and practice, which aimed to develop learning instructions based on the RBT especially from the perspective of the van Hiele model in the development of higher levels of geometric thinking.

Connecting Mathematics and Programming

TAI Yee Ka
CityU SCOPE

To the author, mathematics is a feasible answer for the value of humanity in the era of emerging AIs. While machines ease our workload from heavy computation and routine reasoning, we can afford more time to focus on the purity and beauty of mathematics and acquire an appreciation. With this important appreciation, one can cultivate a robust mind capable of enduring even adversities in one's life journey and equip oneself for better control over powerful tools like programming.

In attempts to connect the mathematics of pure beauty and the programming for powerful computation, the author collaborated with various parties on Python workshops for counting, basic statistics, deep neural networks, and a demonstration classroom, etc. More recently, the author utilized generative AIs like DeepSeek to continue the endeavor in this direction. As a result, here is the convenient transformation of mathematical ideas into associated coding for fast development of learning materials when the coding process is accelerated significantly with generative AIs.

Peer-Assisted Learning in Hong Kong Mathematics Education: Insights About Student-student Interactions, Affordances, and Challenges

WANG Hao Yi, ZHANG Xin Yuan, LIANG Bi Yao
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Peer-assisted learning (PAL) has been implemented in diverse educational contexts and shown to enhance students' academic outcomes and social growth, but little is known about the qualitative nature of student-student interactions and the affordances and challenges students experience during PAL. This project explores the application of PAL in a Hong Kong secondary school through two mathematical tasks: the Paper Folding Task on similar triangles and the Spider and Fly Task on the Pythagorean theorem.

This study was conducted at a local Hong Kong school, where students formed pairs to enact PAL. Within each student pair, the students took turns to be the tutor and tutee, working on the prepared tasks and learning from each other's mathematical thinking. Eight selected students also took part in an individual follow-up interview to debrief on their learning experiences. All research sessions were video recorded for qualitative analysis of peer interactions as well as students' insights about PAL.

The data analysis suggests that the students had overall positive and engaging experiences with PAL. Specifically, they gained a deeper understanding of the mathematical content through playing the role of a tutor, engaging in in-depth conversations with their peers, and learning about alternative ways of thinking from their peers. Meanwhile, the students also conveyed challenges with anticipating unexpected solutions and asking effective questions to support and advance their peers' thinking.

Use of Different Kinds of Mathematical Tasks in Bridging the Gap Between Informal Spoken Language and Formal Written Language in Learning and Teaching of Mathematics

WONG Ka Lok
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Mathematics is notoriously challenging to many students in schools. Among others, the abstract nature of mathematical concepts and their symbolic representations bring a host of difficulties to the students of mathematics. In this connection, issues arising from the inevitable use of formal mathematical language in the processes of mathematical learning and teaching are relevant to our teaching to students, especially in the case that the language used as the medium of instruction is not the students' first language. Premised on the insights of David Pimm about mathematical communication, this presentation will be mainly concerned with the gap between students' informal spoken language and the formal written language used in conventional secondary mathematics classroom. With a view to bridging the gap and thus facilitating students in their mathematical learning, the presentation will show different kinds of mathematical tasks designed with reference to a range of widely recognised pedagogical principles or learning theories (e.g. Bruner's concrete-pictorial-abstract progression, the principle of multiple-representations, van Hiele's levels of geometric thinking, etc). While the development of mathematical understanding can hardly be separated from language development, the presentation aims to help participant teachers see possible learning paths accessible to students who are struggling with the language of mathematics. Although language concerns appear to be more relevant to mathematics teachers working in the context of English as the medium of instruction, the close connection between thought and language, be it the first or second language of students, is well recognized. It is thus arguable that the examples of mathematical tasks, together with the underlying pedagogical principles, should find their relevance to mathematics teachers teaching in Chinese as the medium of instruction.

Enhancing Student Confidence and Engagement in Mathematics Through Gamified Self-Access Online Learning

YICK Doi Pei, WONG Wai Yip, CHUI Ka Wai, LUK Cheuk Fai
Methodist College

"Play is the highest form of research." ~ Albert Einstein

This paper outlines a one-year school-based project aimed at boosting student confidence and engagement in junior secondary mathematics (Forms 1–3) through a gamified self-access online platform. Aligned with principles of Variation Theory and gamification pedagogy, the study sought to (1) develop an interactive digital learning environment and (2) enhance students' problem-solving skills and motivation in algebra.

Over 300 game-based exercises (via Quizizz and Wordwall) and 30 explanatory videos were created, covering six algebraic topics. These resources were integrated into formal lessons, remedial sessions, and self-directed learning cycles. Three teacher training workshops emphasized innovative instructional strategies, including gamification design and data-driven feedback.

Mixed-methods data collection included pre-/post-tests, as well as student and teacher surveys, to evaluate efficacy. Results revealed significant improvements: average quiz scores increased by 31% to 677% from pre-tests to post-tests across topics, with students demonstrating heightened engagement through repeated exercise attempts and active participation. Teacher surveys indicated that 85% of respondents reported enhanced pedagogical skills, particularly leveraging technology for differentiated instruction.

The project fostered cross-form collaboration with senior students mentoring juniors and established a sustainable open-access platform for students beyond the school.

Keywords: Gamified learning, self-access platform, mathematics education, student engagement, teacher professional development.

Polypad 於小學數學的應用與實踐

列啟俊
塘尾道官立小學

近年來，Polypad 在學界逐漸受到關注，被視為一項創新且實用的數學電子學習工具，為小學數學教學注入全新動能。在這個數位化迅速變革的時代，我們是否能透過這樣的工具真正提升教學效能？ 是次工作坊，講者將分享於本學年任教五年級數學科期間，利用 Polypad 進行課堂互動的實踐經驗與成效。

講者認為，透過 Polypad 的視覺化與互動性，能有效提升學生的學習動機與課堂參與度，增進學生對數學概念的理解與應用能力，並且提升課堂互動氣氛與教學評估的精準度。然而，要充分發揮這項數位工具的潛力，並非一蹴可幾；在實際推廣過程中，仍須透過教師專業培訓、系統化的教學活動設計、兼顧實體教具，以及適切的評估機制，方能真正達致提升教學效能與學生學習表現的目標。

是次工作坊將涵蓋以下內容：

1. Polypad 的基本介紹與運用方式；
2. 講者經驗分享與成效反思；
3. 示範及實際操作；
4. 問答交流環節。

誠邀各位出席交流，一同探索數位工具融入數學教學的可能性，共同邁向更有效能的教學新時代。

玩中學：幼兒數學的形狀與空間

江詠藍、梁恩童、蔡藝瑄、張灝泓、梁諾彤
香港都會大學教育及語文學院

嘗試錯誤（trial and error）是幼兒在數學學習過程中的必經階段。透過遊戲化的活動方式，幼兒能夠在經歷錯誤的過程中內化知識並進行調適，從而實現學習目標。這種方式呼應了杜威（Dewey）提出的「做中學」理論，強調學習應建立在實踐與經驗的基礎之上。遊戲化的學習設計不僅為幼兒創造了一個輕鬆愉快的環境，使其能夠主動探索數學概念，同時也提升了他們對學習內容的興趣與參與感。這種學習方式不僅促進了幼兒的主動性，更幫助他們在具體情境中應用數學知識。

本教學活動以形狀為主題，透過多元化的遊戲化活動，引導幼兒以感官探索形狀，逐步建立配對及空間概念。活動設計從具體實物延伸至抽象概念，協助幼兒奠定數學概念的基礎。此教學模式特別適合應用於學前教育，讓幼兒在互動中提升數學能力，並在遊戲中享受學習的樂趣。

融入 5E 教學法的數學繪本教學探究

李佩盈、王書琳、鄭永健
香港都會大學教育及語文學院

本文透過介紹自製繪本及配合 5E 教學法進行教學來建立幼兒對「比較」概念的認知，探索繪本和 5E 教學法在教學上的重要性及如何幫助幼兒學習數學概念。本文解釋繪本教學活動，闡釋可如何讓 K2 幼兒實行 5E 教學法中的參與、探索、解釋、擴充、評鑒各步驟來達到學習目標。

5E 教學法是學生主導的教學模式。數學的各種概念於生活中無處不在，5E 教學法可適用於幼兒生活上遇到的大部分課題，培養幼兒主動思考、尋找答案以及應用知識的習慣。而數學學習正是透過活動經驗及自主發現組成的，可利用繪本的趣味性吸引幼兒投入參與課堂活動、加強自主發現。

本文旨在啓發幼稚園老師思考 5E 教學法及繪本的互相配合對於 K2 幼兒的數學學習有什麼幫助。

遊戲中學習：認識百變「正方體」

何國文、傅靖琳、鄺美欣、呂樂兒
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日常生活中，正方體的物品隨處可見。你是否曾思考過，除了其基本特徵之外，正方體的變化也隱含著數學意義？對於學習幾何和空間想像力的幼稚園學生來說，理解這些變化有助於加深對立體幾何的認識。本節將由三位香港都會大學二年級學生透過工作坊，分享他們如何通過數學遊戲來認識正方體的高班幼兒數學活動，並探討根據《幼稚園教育課程指引》（2017）設計遊戲的方向，以提升幼兒學習數學的樂趣。

小學生可以進行數學建模嗎？

汪滌塵
香港教育大學

數學建模是連接數學與現實世界的重要能力，其教學已從高等教育逐步延伸至中學，甚至小學和幼稚園。這一趨勢促使教育工作者思考：為何要推動數學建模教學？小學生是否具備相關能力？他們能參與到什麼程度？以及小學數學建模教學應如何開展？本講座將基於本地小學的實踐經驗，深入探討這些問題，為數學建模教學的創新與實踐提供啟發。

Polypad 體驗工作坊（小學數學）

柯志明
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Polypad 是一個操作簡易的動態數學學習平台，讓教師能夠和學生輕鬆地對幾何圖形及數學物件進行實驗和探究，對提升動機和建構知識有很大幫助。在本工作坊中，講者會和參加者體驗一下 Polypad 在一些小學課題（如除法、圖形分割與拼砌、以天平解方程、立體圖形的摺紙圖樣）的應用。參加者請自攜筆記簿電腦或平板電腦出席。

運用 GeoGebra 促進對幾何定理「因果」的理解

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中學數學課程的幾何定理大多比較直觀，而且往往命題和逆命題 (Converse) 同時成立，令學生較難分辨定理的「因」（前提 premises）和「果」（結論 conclusions），影響他們學習幾何的動機。講者會在本環節中分享一些運用 GeoGebra 設計的幾何定理教學課件 (https://ggbm.at/uspmtnzh)，並和與會者一同探討如何運用這些課件幫助學生理解定理中的「因果」關係，提升他們的學習動機，並培養他們的幾何思維。

數學創意設計實踐活動

徐寶思、梁彥琦、郭寶聰、吳子健
澳門浸信中學

本工作坊將重點展示我校開展的「創意密鋪圖形設計」和「創意函數圖像設計」兩項數學設計活動。這些活動都在數學軟件上操作，內容都源於教材又高於教材，具有科學探究的深層意義。

在「創意密鋪圖形設計」部分，我們將展示如何突破教材中僅介紹正多邊形密鋪的限制，通過分割重拼法、旋轉對稱構圖法、中心對稱構圖法、挖補法等創新方法，使用形狀和大小完全相同的精美圖形，實現平面的藝術化密鋪。

在「創意函數圖像設計」環節，我們將展示學生如何運用圓、橢圓、三角函數等圖形，經過精心的函數選擇、參數調整、圖像疊加與組合，以及色彩的配置等步驟，並利用函數曲線的動態軌跡，將抽象的數學概念轉化為富有藝術表現力的視覺作品。

工作坊特色：

- 展示從數學原理到藝術成品的創作歷程
- 體現數學理論嚴謹性與藝術創作的完美結合
- 呈現學生作品的實際案例與創作心得

通過實物展示和創作過程解析，讓參與者共同操作，深入理解這些創意作品如何融合理性的數學思維與感性的藝術表達，體驗數學教育的創新實踐。

一個包含編程和建模的數學活動建議

梁子傑
退休中學教師

在 1999 年出版的《圖龜幾何》中，講者介紹了一個名為 polyspi 的程序。講者後來發現，只要在該程序上做少許的改動，便會得到一個令人意想不到的效果，從而發展成一個十分有趣和具挑戰性的數學建模及編程活動。同時，透過分析和討論，學生亦可認識到，原來那個最無理的無理數，其實是相當有理的！

從二維平面的紙張製作柏拉圖多面體的實践探索

常文武
上海市普陀區青少年教育活動中心

柏拉圖多面體在數學、物理、化學，建築學科都有涉及，而對於數學學科而言，最直接的提及是在立體幾何的課堂。在立體幾何教學中，教師多半會帶鐵絲焊接的多面體框架進入教室展示。但由於教具不可能人手一份，而傳統粘合方法製作一個這樣的卡紙模型實屬不易。這些限制導致學生無法充分觀察和體驗這些優美的對稱幾何體模型並開展深入的數理探索。現在基於本人發明的「榫卯拉鍊」技術，這些障礙已經被完全被克服。

本次面對面的手作活動，每一位參與者將經歷用 12 片材料零件構建一個正 12 面體的全新體驗。歷時 40 分鐘的活動將由本人主持並覆蓋多達 40 位一線數學教師。根據現場的實際情況，我將引導參與者提出相關的數學問題。例如正 12 面體的 20 個頂點周遊問題，或者探尋對徑點距離與棱長的關係。在時間允許的情況下，還將親自演示正 12 面體等距變化為大正 12 面體的過程與方法。

拼出數學的未來：部分與整體

梁諾彤、莊天恩、吳曼晴、羅卓嵐、李芊穎
香港都會大學教育及語文學院

本活動探討「部分、部分、整體」（Part-Part-Whole）教學策略在數學學習中的應用，特別聚焦於學前教育階段的幼兒。此策略強調透過具體實物的操作與探究，幫助幼兒建立對數學概念的深層理解，並為其未來進入小學一年級的數學學習奠定基礎。

在數學教育中，組合數的概念對於幼兒數學思維的發展至關重要。透過具體實物的操作，幼兒能從一一對應的基本技能逐步提升至直觀理解部分與整體之間的關係，這是數學學習中的一項核心能力。當中一系列結構化的活動，旨在引導幼兒從具體操作逐步過渡到抽象思維，包括數字與符號的運用，讓幼兒在探索中發現數學的規律與奧秘。此外，活動強調幼兒之間的互動與合作，透過遊戲化的學習模式提升數學能力，同時增強幼兒對數學學習的興趣與投入感，以具體的實踐經驗，促進幼兒數學概念的建立，為其未來的數學學習做好充分準備。

當小學數學遇上新興科技（一）：設計「知行合一」的教學活動

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梁鴻
保良局朱正賢小學

長久以來，小學數學教學除了希望學習者能夠理解掌握數學的概念（concept）、程序（process）和原理（principle），也就是數學在「知」的層面上的學習（Knowingabout-What, How and Why）外，我們更希望學習者能「學以致用」，將數學實踐延伸至「行」的層面（Knowing to - Act in the right context and moment）上。這就是教學的「知行合一」！廿一世紀的數學建模（mathematical modeling）教學強調的正是數學與現實世界的知行合一，而 STEM 和 STEAM 教學強調的是跨學科的知行合一。培養學習者將數學的思維模式變成思考習慣（Habits of mind）至關重要。本工作坊將通過不同的事例，分享我們如何利用 Google Teachable Machine，Polypad，CoSpaces 和 Google Earth 等 AI 與新興科技平台，配合 Geometric Habits of Mind 及 5E 教學框架，設計促進知行合一的小學數學教學活動，讓小學生在富趣味的情境中，愉快地學習及應用數學。

當小學數學遇上新興科技（二）：教大學生「知行合一」的創意實踐

張家麟、莊詠斯、劉海沛、梁焯婷、林振銘、鍾雪聲、葉伶俐
香港教育大學數學與資訊科技學系

本工作坊是《設計「知行合一」的教學活動》工作坊的延續。工作坊分為兩部分，首部分將分享教大學生如何利用 AR/VR 軟件 CoSpaces/Spatial 及 Machine Learning 平台，設計歷奇活動，引導小學生進行評估學習，以及應用 Machine Learning 平台進行三角形、正方形、長方形等平面圖形分類，促進他們「知行合一」的自主學習。工作坊的第二部分，將分享教大學生如何應用 Polypad 平台，設計富有中國文化元素的三角形教學活動。活動既能激發學生的創意設計思維，也是提供小學生進行 Machine Learning 分類活動的數據泉源！

探究遊戲與多感官學習：基本對稱與幾何形狀的概念

張語喬、簡泳茵、黃祉瑩、潘嫚廷、何國文
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在現今的教育環境中，多感官學習已成為提升學生理解和記憶的關鍵方法。透過數學遊戲，幼兒可以在豐富的互動中探索基本的對稱性和幾何形狀，從而增強學習體驗並促進數學認知發展。本次工作坊由四位香港都會大學二年級學生分享他們為低班幼兒設計的數學活動，展示如何通過數學遊戲與多感官學習，利用觀察鏡像加深對對稱概念的理解，並鼓勵幼兒從生活中尋找與圖形相關的事物，進而體會數學與日常生活的緊密連結。

善用科技加強邏輯建構、提升學習效率的兩個實例

黃栢熙、凌美儀
中華聖潔會靈風中學

在日常的教學互動中，我們發現學生有依賴人工智能找尋答案的跡象，但往往缺乏對所得答案的來源作批判或分析，導致難以進行更深層次的學習。在數學學科中，邏輯思維的建構至關重要。同時，資訊科技工具理應為輔助學生培育自主學習的習慣。數學老師們都擁有很多利用資訊科技工具增強教學效能的實例，本文將分享兩個教學實例，展示如何利用現有教學工具加強學生的探究層次及討論空間，及如何透過特定平台展示學生學習成果，促進學生內化所學知識。我們的理念是透過放慢探究學習的步伐，確保每位學生都能體驗到成功建構邏輯的滿足感，並持續推動學生善用科技進行探究來實現自主學習。

科技如何重塑個人化與多樣化的小學數學教學

鄭國城、汪滌塵
香港教育大學

科技的迅速發展，像是人工智能（AI）、數位工具及互動式教學平台，正改變我們教數學的方式。這讓我們開始思考，未來的學生究竟需要掌握哪些數學知識，以及該用怎樣的方式來學習。

本講座將探討如何結合不同的科技，以提升小學數學的教學效能。我們亦會特別討論 AI 在數學運算教學中可扮演的角色，並以一個能支援學習分數加減的聊天機械人（Chatbot）為例，分享如何利用大型語言模型（Large Language Models）來支援個人化學習，讓 Chatbot 在教學中發揮更大的輔助學習的功能。

藉此，我們希望與教育同工一起思考，科技在未來數學教育中的角色和挑戰，並討論如何綜合運用這些科技，打造更靈活且高效的數學學習環境，探索這些科技會如何重塑數學教學。

名不正，則言不順 —
數學學習中的數學名詞及其定義

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在數學課上，數學定義往往不受重視。要非完全沒提及，便是由教師直接道出來；學生會覺得此乃「天授真理」，不容懷疑，只此一家，別無他言。定義似乎可有可無，頂多在考試卷上出現，依書背誦即獲高分。事實上，一個數學定義的產生，要經過漫長的歸納和探索然後提煉出來；在歷史進程中，定義可能多次被修訂或推廣。在教學上，適當地讓學生經歷這種過程，例如靠自己探索一個合理有用的定義，是很有意思的學習經驗。今天，有了新科技輔助，例如動態幾何互動軟件；而學習內容亦著重建模過程，因此數學定義這個課題，或許更值得提及了。本文通過教學上的一些例子，對這課題作面面觀。

「從平面拼圖翻出立體拼圖」的探索研究

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繼七巧板拼圖後，筆者開展了「從平面拼圖翻出立體拼圖」的探索研究，這個探究初步劃分成兩部分：

(1) 「五連方」拼圖遊戲

(2) 「索馬立方」拼圖遊戲

這次工作坊的活動內容主要討論「五連方」拼圖遊戲的探究部分。

「五連方」拼圖比較特別，它既可以是純粹平面拼圖，亦可以作為立體拼圖。正因如此，可以透過五連方拼圖，以平面圖形（例如 $1\times4\times5$，$1\times5\times12$）作為拼圖基礎，從而擴展至立體圖形（例如 $2\times3\times10$，$2\times5\times6$，$3\times4\times5$）。

透過工作坊，參與者可以體驗以下的拼圖技巧：

(a) 邊界限制；

(b) 劃分區域的面積（體積）、形狀；

(c) 消彌拼塊不規則邊界的「靜式」；

(d) 對稱「靜式」、不變形「靜式」等。

除了長立方體外，筆者亦嘗試探討以同樣的拼圖技巧，有效地拼出更一般的立體圖形。

從課堂活動到校外比賽：數學建模教學的行動研究

鍾永康
華仁書院（九龍）

早於 2017 年，香港《數學教育學習領域課程指引（小一至中六）》中便提出學與教的著眼點應從常規計算和操練轉向問題為本探究或數學建模活動，並鼓勵學生進行深度學習。同時，內地《普通高中數學課程標準（2017 年版）》亦加強了課程中數學建模的角色，並指出數學建模充分體現了數學的廣泛應用性，為學生體驗和理解數學與外部世界聯繫提供了最基本途徑和思路。自此，教育局數學教育組便持續推行有關數學建模的先導計劃及種籽計劃，同時於 2023/24 學年開始舉辦中學數學教師數學建模增潤證書課程，藉此培訓更多教師，以便將數學建模注入中學數學科以推展 STEAM 教育。

另一方面，華仁書院（九龍）亦於 2023 年開始積極於數學課堂中推展數學建模教學活動，並鼓勵對數學建模有興趣之學生參與不同類型的校外數學建模比賽。講者會引用一些上海高中數學教師於課堂推行數學建模之經驗及西方學者提出之 DIFMT (Design and Implementation Framework for Modelling Tasks) 框架，探討如何設計適合於香港課堂進行的數學建模活動，並且會分享一些課堂活動成果。同時，講者會探討建模活動對學生解決問題的能力、分析技巧和整體學習態度的影響。最後，講者會展示如何從課堂活動開始，逐步提昇學生學習數學建模之動機，並於校外比賽中促進學生之協作學習、解難能力及創造力。

摺紙幾何：A 系紙的探究

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A 系紙（包括在學校每天都會用到的 A4 紙）是人人都會接觸到的，但它的幾何性質，在中學數學課堂上，卻極少被討論。A4 紙的長度和闊度為甚麼是210 mm × 297 mm？在一張 A4 紙上，我們可以找到甚麼有趣的幾何性質呢？這獨特的比例又如何幫助我們省時省力的去摺一些和正立方體相關的立體呢？讓我們通過動手摺，發掘這比例特別的紙張所隱藏的幾何連繫。

《平截頭體的鄉愁》數學詩展覽

關智權（筆名：紀幾何）
聖傑靈女子中學

談到數學與美學的跨界，一般人通常會想起數學與繪畫、建築或音樂的關係，數學和文學的跨界討論和例子則相對較少。 香港教育局近年積極推廣跨課程閱讀（Reading across the Curriculum, RaC）及跨課程語言學習（Language across the Curriculum, LaC），與數學相關文學閱讀，值得重視和推廣。

談到數學與文學的互動，不少人會想到烏力波（Ouvroir de littérature potentielle）。烏力波又名「潛在文學集團」，是法語作家和數學家推動的文學運動，運動追求通過運用數學、邏輯、以及各種形式限制來進行文學實驗。在華文文學界方面，較為人熟悉的有台灣詩人曹開的數學詩，而是次《平截頭體的鄉愁》數學詩展覽的主角，香港詩人/數學老師紀幾何的數學詩，則是香港學界對數學詩創作的一次新嘗試。

紀幾何（筆名，原名關智權）現為中學校長，曾教授中學數學二十多年，並曾撰寫近二十套數學及電腦科教科書 / 參考書。關氏亦曾於數學教育雜誌撰寫專欄。 紀幾何的詩集《平截頭體的鄉愁》（石磬文化，2025）是香港第一本數學詩集，各章節以斐波那契數列排列。詩集內的詩作主要以與中小學數學課程相關的數學概念或趣味數學為題（如「通分母」、「旋轉對稱」、「河內塔」、「負負得正」、「函數」等），詩作靈感來自數學老師 /詩人對數學的感受與洞見。《平截頭體的鄉愁》把數學和文學連結，以不一樣的方式展示數學美，同時推廣數學科的跨學科閱讀 。

「《平截頭體的鄉愁》數學詩展覽」以展覽形式展出詩集內多首詩作。詩人亦會於指定時段駐場，與參觀者 / 讀者交流。

透過可見的音樂演繹抽象的數學世界

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在當前教育環境中，跨學科的合作越來越受到重視。數學平台 Polypad 提供了小學數學電子教具的同時，亦將數學概念融入了音樂元素——圖形的面積、周界，以至數類如數粒、數條等，都可以以音高、節奏和旋律表示。本校透過周界教學活動，讓學生透過音樂演繹抽象的數學概念，為學生提供了豐富的學習體驗。本文記錄了本校由數學課堂的教學設計，讓學生把抽象的數學概念透過音樂變得可視化及有趣；以及本着「希望每位孩子也發亮」宗旨，組成「數學管弦樂隊」，讓對喜歡音樂及數學的學生，展現出更加出色的創造力。

【關鍵字】數學；音樂；Polypad；跨學科；可視化