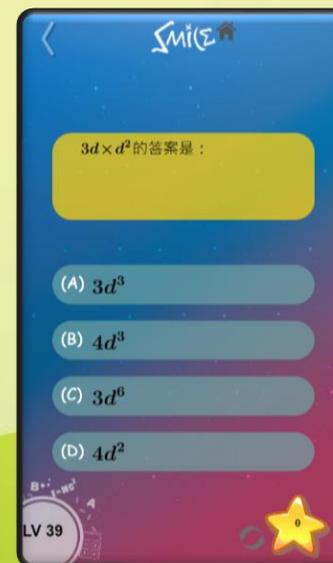
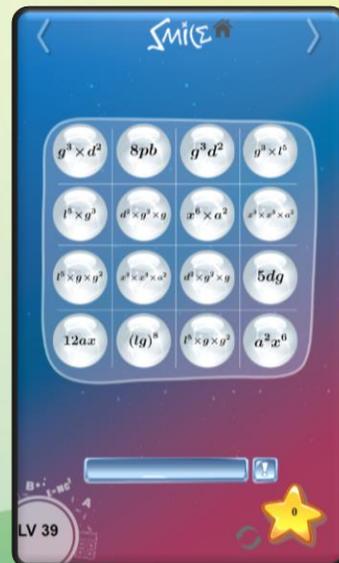


Using digital game to enhance Mathematics learning in Secondary education

透過數碼遊戲增強學習數學的能力



Project No: 2017/0862

By VTC Youth College and
Pui Tak Canossian College

Rundown

	<u>Activities</u>	<u>Guest</u>	<u>Time</u>
1	Opening Remarks	Dr. CHEUNG Chor Wang, Alice <i>Principal Lecturer, VTC Youth College (Kwai Chung)</i>	3-5 minutes
2	Project Collaboration	Mr. TANG Sze Ho, Vincent <i>Vice-principal, Pui Tak Canossian College</i>	3-5 minutes
3	Gamification approach in Learning Mathematics	Mr. YIM Yiu Chung, Reggie <i>Senior Lecturer, VTC Youth College (Kowloon Bay)</i>	10-20 minutes
4	Implementation of the Game Application	Mr. LAU Wai Tak, Diks <i>Assistant Lecturer, VTC Youth College (Kowloon Bay)</i>	5 minutes
5	Closing Remarks	Mr. YU Tsz Him, Larry <i>Senior Lecturer, VTC Youth College (Kowloon Bay)</i>	3-5 minutes

MC: Mr. LAU Wai Tak, Diks
Assistant Lecturer, VTC Youth College (Kowloon Bay)

1. Opening Remarks



青年學院

❖ 共8間院校



A Nurturing Teaching team

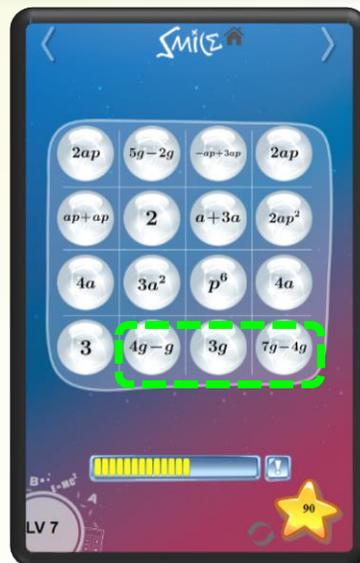


Up-to-date Teaching and Learning Resources

For Diversity in Learning



Happy Teaching and Learning



2. Project Collaboration



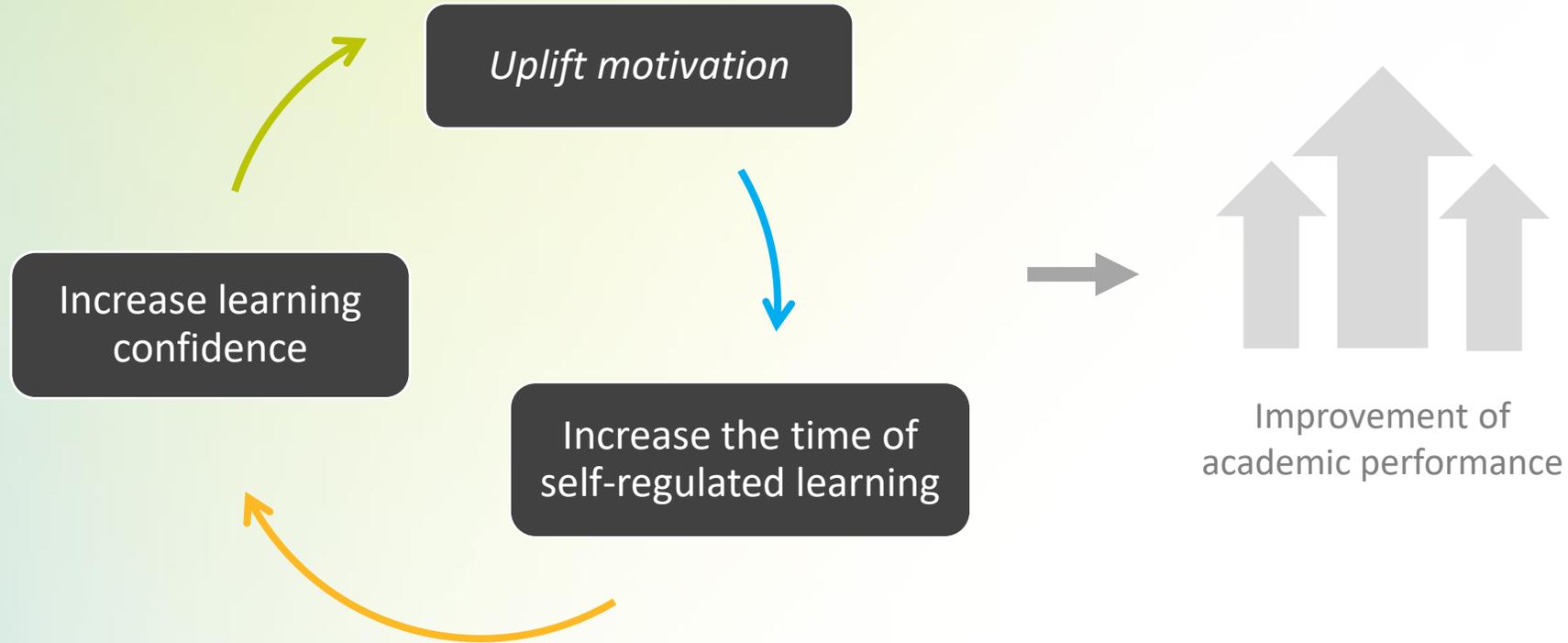
2. Project Collaboration

Project milestones

No.	Functions and processes	Period
<u>1.</u>	<u>Preparation work</u>	Jul – Dec 2019
<u>2.</u>	<u>Mobile game development</u>	Sep 2019 – Apr 2020
<u>3.</u>	<u>Tutorial development</u>	Sep 2019 – Apr 2020
<u>4.</u>	<u>Assessments for each topic</u>	Sep 2019 – Apr 2020
<u>5.</u>	<u>Consolidate as a whole learning package</u>	May 2020
<u>6.</u>	<u>Testing and preparation of trial run, game competition and survey</u>	Apr – Aug 2020
<u>7.</u>	<u>Implementation of trial run, game competition and survey</u>	Sep 2020 – Mar 2021
<u>8.</u>	<u>Evaluation and recommendation report</u>	Apr – Aug 2021

2. Project Collaboration

Attainment of Project objectives



3. Gamification approach in Learning Mathematics

Background research



Picture source: samsung.com

**~3 hours mobile usage
per day (HK)**

We are social & Hootsuite, 2020



Picture source: microsoft.com



Picture source: instagram.com



Picture source: youtube.com

**Students spent too much time on Games, social media
network and online video**

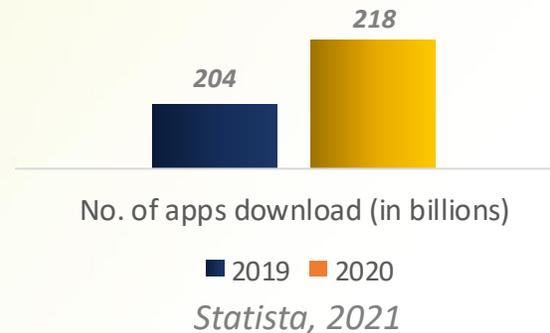
HKU (2017), GO-Globe, (2014)

43% on game

26% on social media network

**Time spent on mobile
entertainment**

Go-Globe, 2015



■ 2019 ■ 2020

Statista, 2021

**Tremendous
growth in
mobile apps**

Can we shift some of the mobile usage from entertainment to learning in order to mitigate the damage?

Literature Review

Gamification is an effective learning approach for Classroom atmosphere and learning motivation, increasing learning confidence and performance

- Enables a **pleasant and relaxing classroom** atmosphere (Jong, Lee & Shang, 2013) which fosters an **interactive, interesting and lively learning process** to our students (Huang, Huang & Wu, 2014)
- Significantly uplift students' **willingness, interest** (Huang, Huang & Wu, 2014) and **enthusiasm** to peruse new knowledge (Wang & Towey, 2013). It also maintains the **learning curiosity** of students and keep them to learn continuously (Jong, Lee & Shang, 2013)
- Effectively engage our students and facilitate a **positive learning attitude** (Kiili, Devlin, & Multisilta, 2015)
- **Learning anxiety** could be mitigated result in uplifting in both learning motivation and performance (Huang, Huang & Wu, 2014)
- The use of gamification tools **could increase learners' confidence** (Faghihi et al, 2014; Cheung, n.d.; Huang, Huang & Wu, 2014)
- **Foster students to learn** (Hew & Cheung, 2010)

What is SMILE?



Design of the gamified learning



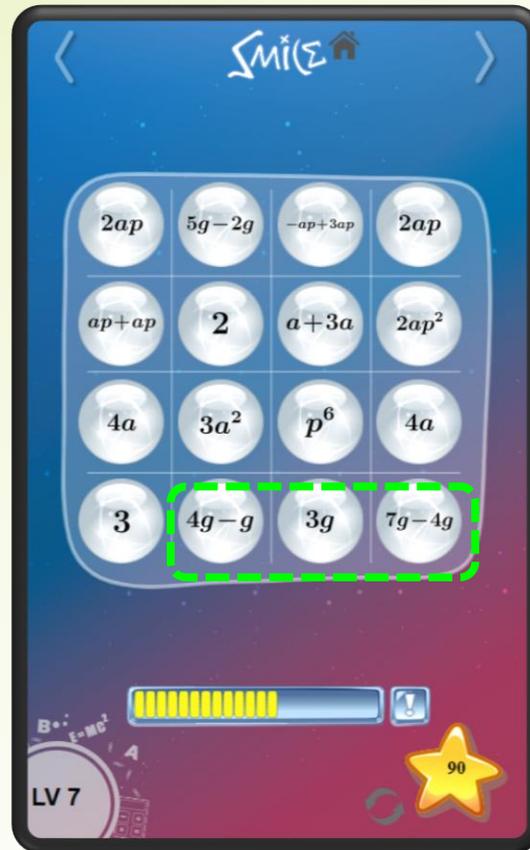
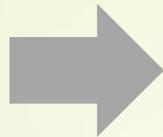
Break down a complex topic into 3 or more manageable units

Design of the gamified learning

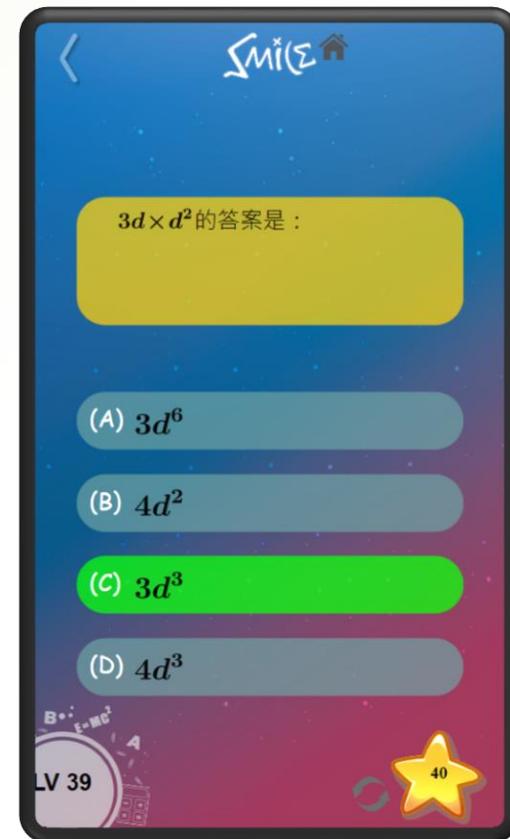
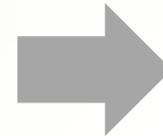
In each unit, learning video, practice in game mode and assessment are provided



Learning video



Practice in Game Mode



Assessment

List of deliverables completed

- Completion of the digital game with 90 levels with
 - ✓ Learning videos
 - ✓ Practice in game
 - ✓ Assessment in multiple choice format
- Completion of student questionnaire survey
- Completion of trial run with Control and Experimental group setup

課題 3：代數式乘除

A. 代數式乘法

我們可以字母來表示未知數，例如我們可以用 b 、 h 和 A 來表示一個三角形的底、高和面積。我們亦可利用代數式來把未知數聯繫，例如三角形面積 = $\frac{1}{2} \times$ 底 \times 高，亦即 $A = \frac{1}{2}bh$ ，讓人知道各未知數之間的關係。

在代數式乘法，我們可以省略未知數和未知數/數字之間的“ \times ”號，所以 $a \times b$ 可寫成 ab 。另外， $a \times b$ 亦可以「 a 乘以 b 」、「 a 與 b 之積」或「 a 的 b 倍」來表示。

例題：

文字	以代數式表示
a 乘以 b	$a \times b$ 或 ab
c 的 d 倍	$c \times d$ 或 cd
e 、 f 與 g 之積	$e \times f \times g$ 或 efg
x 的 5 倍	$x \times 5$ 或 $5x$
3 的 y 倍	$3 \times y$ 或 $3y$

老師提醒您：

當一個未知數乘以另一個未知數時，乘的次序可以改變，例如在上方第一個例子， ab 亦可寫成 ba 。

但當一個未知數乘以一個一數字時，數字則必須先寫，例如在上方第四個例子，在省略“ \times ”號後， $x \times 5$ 就必須寫成 $5x$ 。

透過此 QR code 進入遊戲練習模式



有影片教學、遊戲及練習，快 D 入嚟啦


$$\begin{aligned} & \frac{3}{a} \times \frac{b}{9} \times \frac{a}{b} \\ &= + \left(\frac{3}{a} \times \frac{b}{9} \times \frac{a}{b} \right) \\ &= - \left(\frac{3}{a} \times \frac{b}{9} \times \frac{a}{b} \right) \\ &= - \left(\frac{3 \times b \times b \times a}{a \times 9 \times b} \right) \\ &= - \left(\frac{3 \times a \times b \times b}{9 \times a \times b} \right) \\ &= - \frac{b}{3} \end{aligned}$$


Online Maths Competition – S1 of Pui Tak Canossian College



Section	Activity
1	Online quiz
2	Solving puzzle in SMILE

Final result (Mathematics Competition for FUN)			
Info Prize	Class	Total score (out of 2000)	Award
Champion	1A	1144	Super Team
1st runner up	1B	960	Great Team
2nd runner up	1C	762	Good Team
3rd runner up	1D	726	Good Team

The best participation class is 1B.

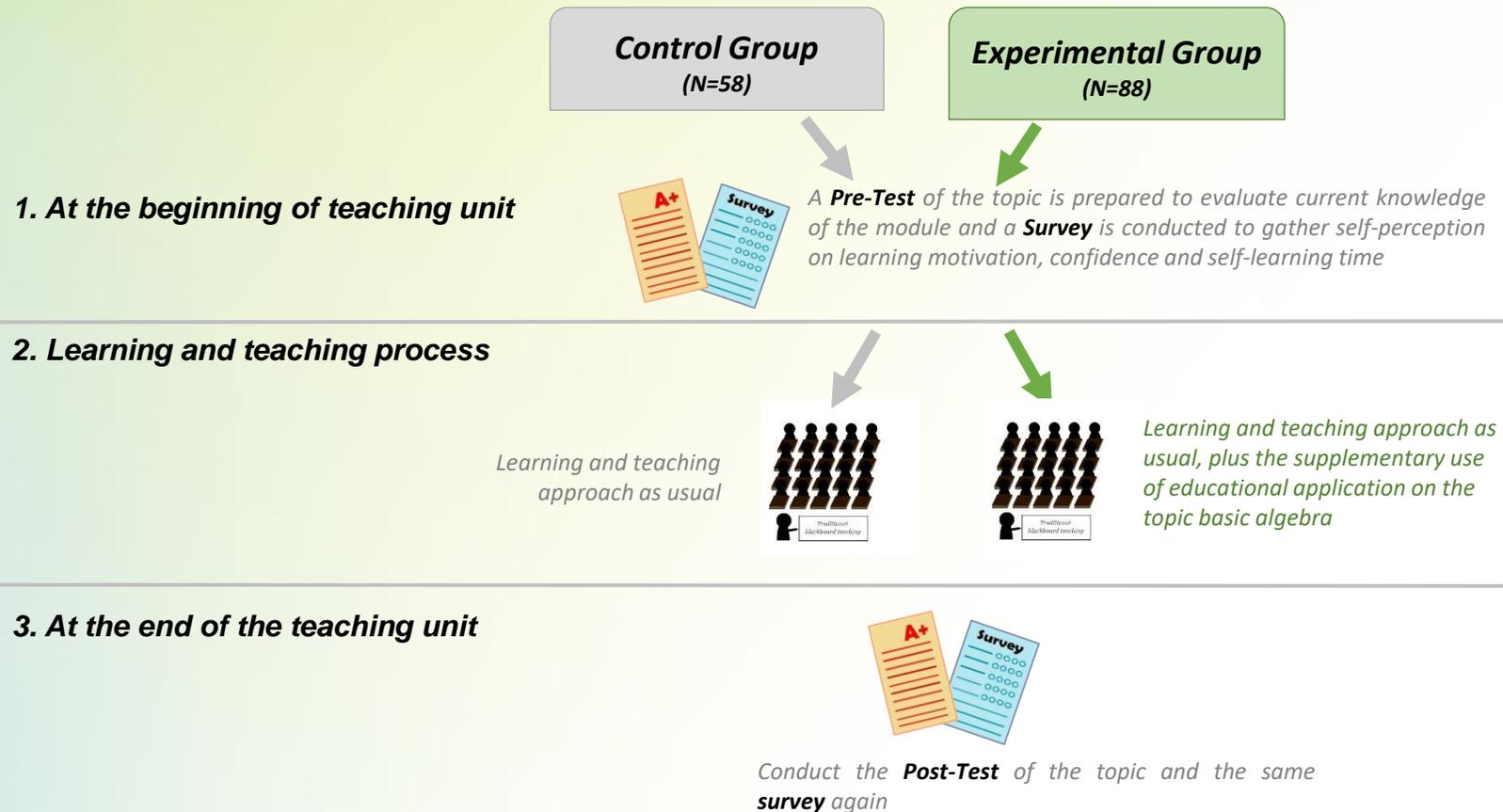
Proactive Team

總括以言，透過此數學程式(apps)能夠增強我學習數學的能力。

➤ 74%同學選擇同意或非常同意

What has been achieved

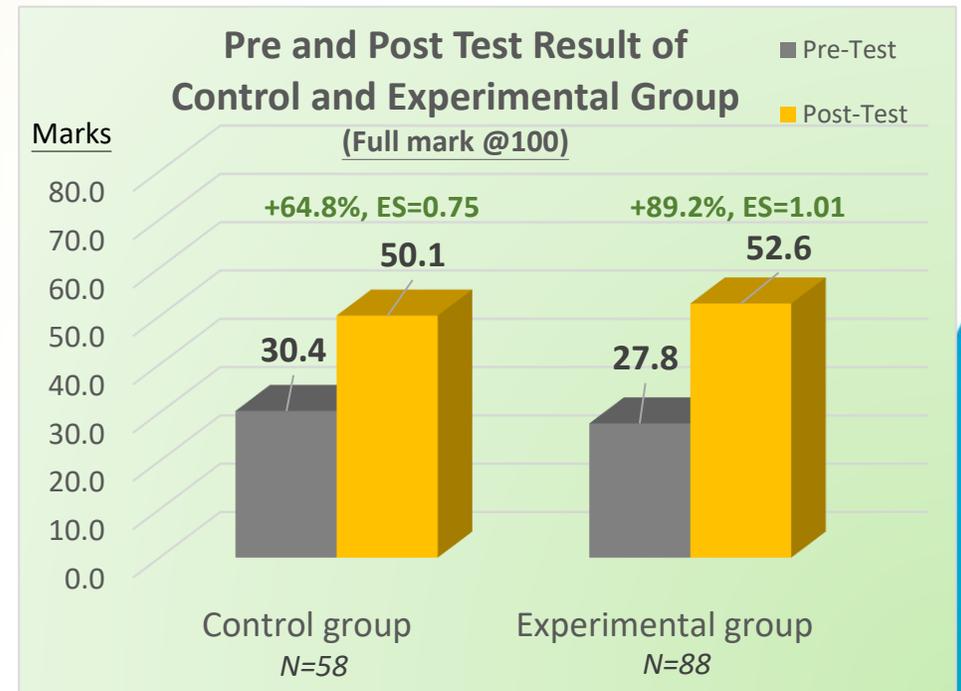
Research study: Setup Control and Experimental group



What has been achieved

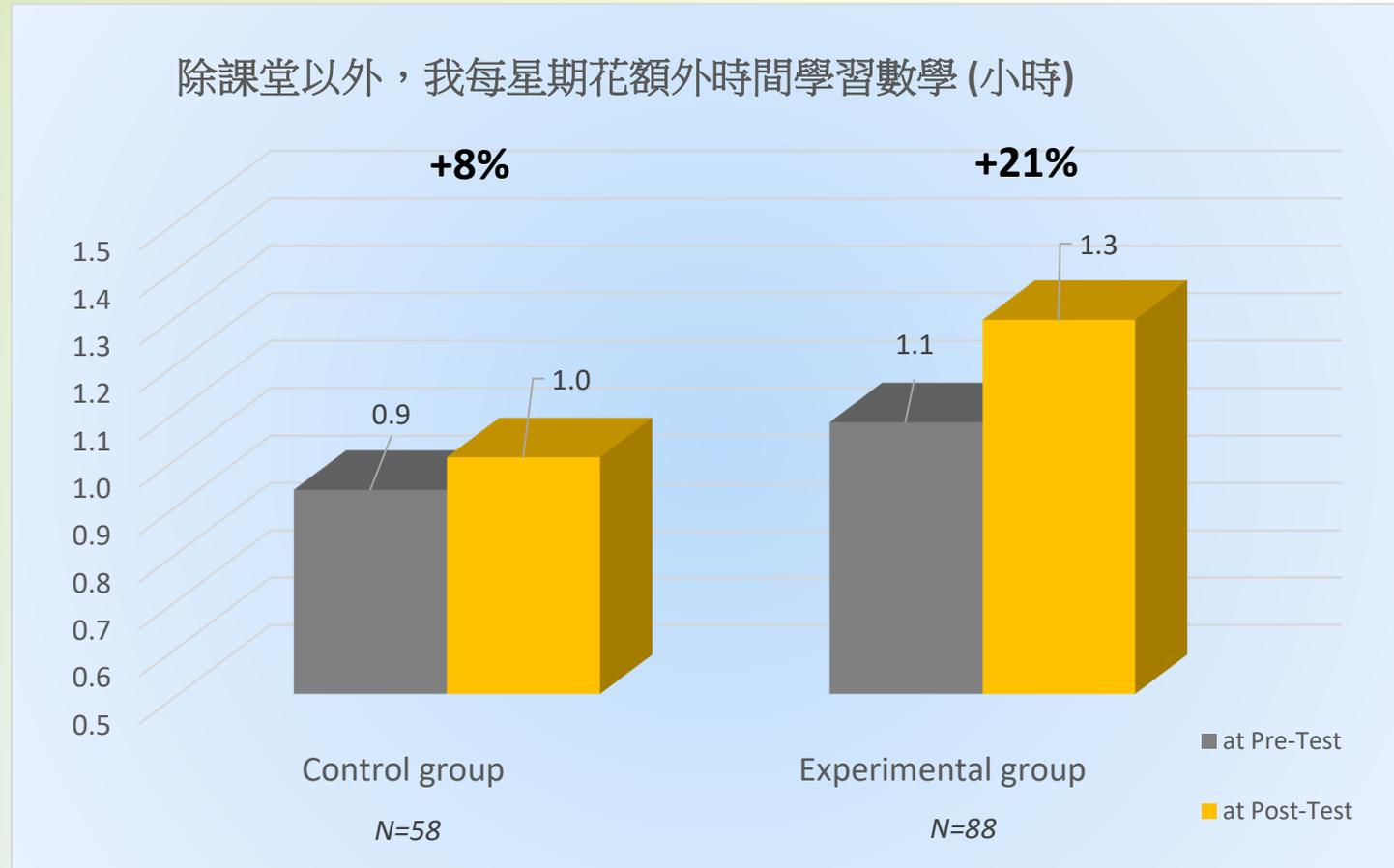
Research study: Setup Control and Experimental group

Group	Type of test	Mean test score (0-100)	N	SD	ES	Sig (2-tailed)
Control	Pre-Test	30.4	58	26.26	0.75	<.001
	Post-Test	50.1				
Experimental	Pre-Test	27.8	88	24.58	1.01	<.001
	Post-Test	52.6				



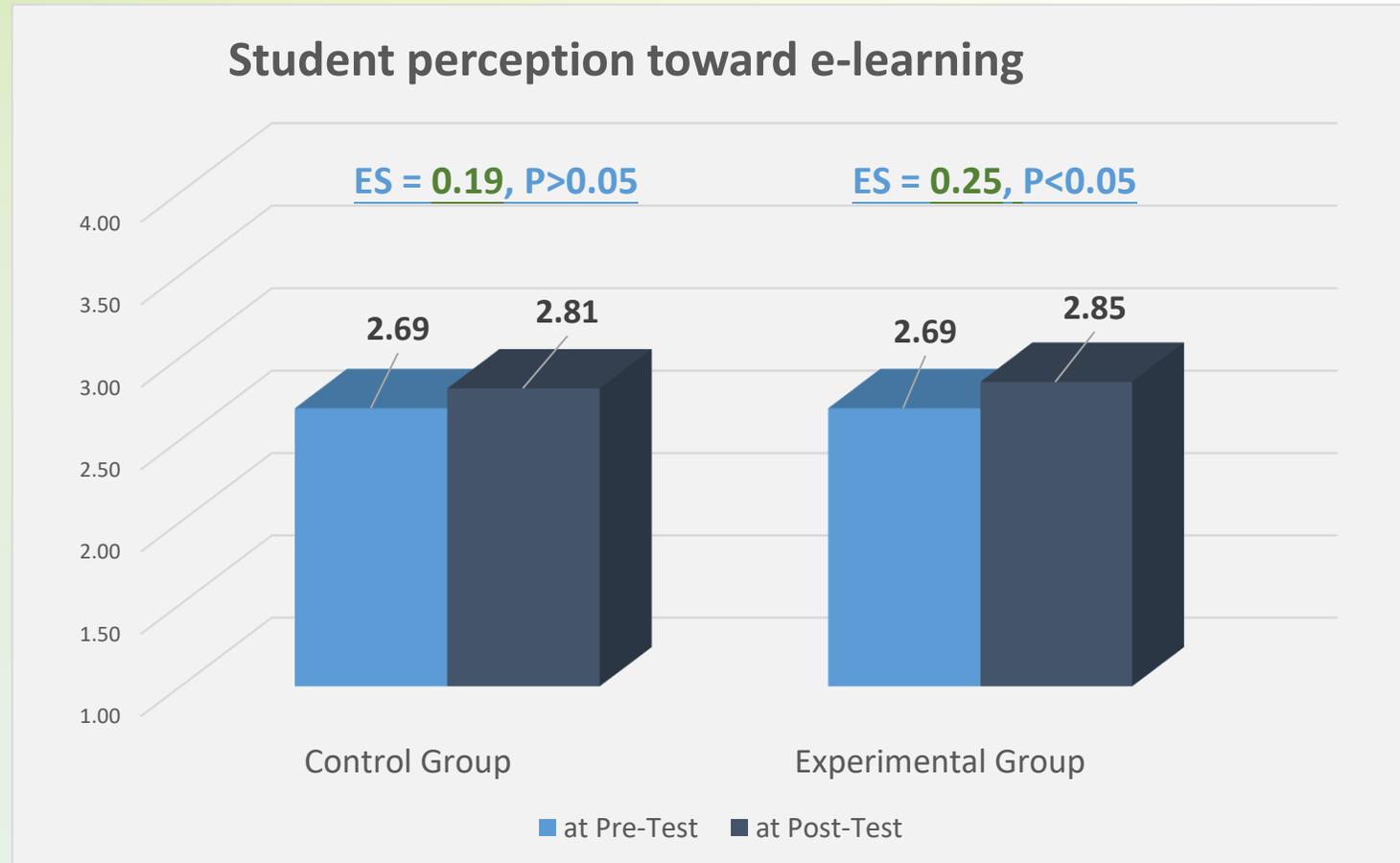
What has been achieved

Research study: Setup Control and Experimental group



What has been achieved

Research study: Setup Control and Experimental group



What has been achieved

Qualitative feedback from teachers and students

- Usage and benefit of the educational application
 - Satisfied and impressed by the new learning approach
 - Could help low ability students to learn with doing worksheets and supplementary gamified practice
- Drawback of the educational application
 - some students expressed answers in some levels were too difficult
 - some other students reported that it highly increased workload
- Encouraging words from students and teachers
 - students' active participation, attempt and satisfaction on using the application.
 - Some students also expressed the application was interesting with comprehensive content.

What has been achieved

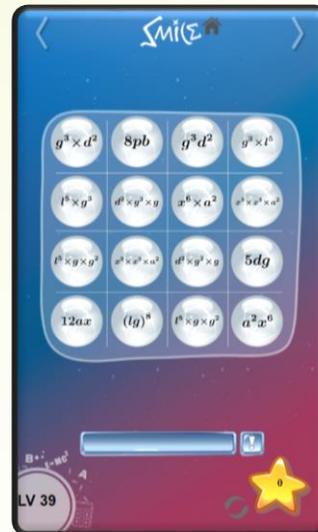
Qualitative feedback from teachers and students

- Way forward to the project development
 - I. Customized instruction provided to students according to their difficulties encountered in learning,
 - II. More varieties of gaming activities could be offered, examples were Prime smash, Four little trees and etc.
 - III. More features could be added to the game, including time bonus, prize and character inside the game, ranking functions, which could significantly raise the excitement and attractiveness of the game.

4. Implementation of the Game Application



<https://www.qef20170862.com/>



5) Closing Remarks

Student Satisfaction on Gamification Approach

對使用本程式輔助學習數學的觀感的問卷調查



Q5. 在遊戲及教學影片的輔助下，我更願意學習數學

Q6. 我希望其他數學課題也加入影片教學、遊戲模式及練習

Q11. 此數學程式(apps)令課堂以外有更多機會學習數學

Q13. 我希望使用此數學程式(apps)來重溫過往的數學課題

Q15. 總括以言，透過此數學程式能夠增強我學習數學的能力。

(參與人數：N=454)

嘉諾撒培德書院	204
李求恩紀念中學	156
高雷中學	94

(問卷選項：非常同意 / 同意 / 不同意 / 極不同意)

5) Closing Remarks

Special Thanks to:

- Quality Education Fund 優質教育基金
- Pui Tak Canossian College 嘉諾撒培德書院
- Lee Kau Yan Memorial School 李求恩紀念中學
- Ko Lui Secondary School 高雷中學
- VTC Youth College (Kowloon Bay) 青年學院(九龍灣)
- VTC Youth College (Kwai Chung) 青年學院(葵涌)

**For more project collaboration,
please feel free to contact us**



Thank you..!

