### 資訊科技教育教學法系列: 在小學策略性運用資訊科技工具設計教學活動 以提升學生以電腦為本的協作解難(CPS)能力 (第一節)









#### 第二節

- 日期:2018/05/11 (星期五)
- 時間:18:30-21:30
- 地點:香港中文大學崇基校園信和樓614室





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本課程旨在介紹教師如何運用資訊科技工具和創新教學法, 以提升學生以電腦為本的協作解難(CPS)能力。透過本課程 讓學員:

- a) 了解CPS和以電腦為本的CPS的定義,及相關社交和認知技能;
- b) 了解以電腦為本的CPS活動的學習機會、特點、優勢和 限制;
- c) 透過有關社會及科學的CPS活動案例,了解如何運用資 訊科技工具和創新教學法,以提升學生以電腦為本的 CPS能力;



d) 運用各種資訊科技工具(思維導圖工具等創造性工具、 網上論壇等知識建構工具、交流工具和協作工具)創 建與科目有關的簡單CPS活動; 設計和整合以電腦為本的CPS課堂活動; e) 運用常用網上協作平台(進展性和總結性電子評估) f) 監察和評估學習成果;及 了解由CPS延伸的技巧及才能(例如領導技巧、團隊 Q) 管理、時間管理和項目管理),並介紹如何使用資訊 科技培育學生相關才能(例如使用翻轉教室和協作講 故事)





### 第一節:

- 1. 以電腦為本的協作解難(CPS)能力的理論基礎
- 2. 課室設置、環境及學生分組
- 3. 於現時學校網絡環境中應用CPS流動應用程式/平台
- 整合CPS應用程式/平台的介紹及實際操作(如realtime whiteboard、Google for Education、Learning Village等)
- 5. 課業討論



### 課程詳情

#### 第二節:

- 1. 課業討論及回饋
- 2. 網上CPS應用程式/平台的介紹及實際操作(如 AnswerGarden、Coggle、Cacoo、Microsoft Office 365等)
- 3. 社交學習平台(如Edmodo)和翻轉課堂
- 4. 案例:於不同學習領域實踐CPS
- 5. 常見的CPS誤解
- 6. 介紹遊戲化的概念以促進協作學習
- 7. 討論、問與答及課程總結



### 1. Theoretical background of Computer-based Collaborative Problem Solving (CPS) skills





PISA 2015的研究結果已於2016 年12月公布(即以電腦評 估學生的閱讀、數學和科學能力)。

中心於2015年4至5月期間,以隨機抽樣方式,邀請了就讀 於138間中學1,600名15歲學生參加電腦化評估協作解難,

在電腦程式提供的<mark>模擬互動情景中</mark>搜尋和探索,從而解決 難題。中心亦要求學生家長和學校填交一份有關背景資料 的問卷。



研究結果 PISA 2015的電腦化評估協作解難共有52個國家或地區約 125,000 名學生參加。

香港學生的成績名列前茅,協作解難能力位列第三(圖表1)。 香港學生的平均分為541分,稍遜於新加坡(561分)及日本 (552分)學生,與韓國(538分)、加拿大(535分)、愛莎 尼亞(535分)及芬蘭(534分)分數無顯著分別,

比其他華人地區包括澳門(534分)、中華台北(527分)及 中國四省(496分)為佳。女生的協作解難能力均較男生為佳; 香港女生較男生高出36分,達顯著水平。本地學生協作解難能 力顯著高於第一代及第二代移民學生,差距為18及11分。

協作解難能力的級別共分五級,第四級為最高能力級別,第一級以下屬 最低能力級別。

香港學生達到第四級水平的有13.0%,高於經濟合作與發展組織 (Organisation for Economic Co-operation and Development,簡 稱OECD)的平均百分比(7.9%),但低於表現較佳的新加坡(21.4%) 和日本(14.0%),稍高於韓國(10.4%)。



<u>學生對協作解難的態度</u> PISA 2015學生問卷量度了學生對協作解難態度的兩個維度: 一、重視關係(Valuing relationships)及

- 二、重視團隊 (Valuing teamwork)
- 「重視關係」是指參與協作活動時不求自己的利益的利他精神。
- 「重視團隊」是指著重團隊工作過於單獨工作帶來的效果。

香港學生重視關係指數為-0.04,而重視團隊指數為0.05(圖表3),不及 同樣成績優異新加坡及中華台北。

- 整體而言,香港學生對協作解難的態度與OECD平均指數相若,但與其 優異的成績比較,香港學生的協作解難態度只達一般水平,在這方面仍 有很大的改善空間。
- 就性別差異來看,絕大部分參與國家或地區的女生較男生具更高的重視
  關係指數,但男生較女生具更高的重視團隊指數。
- 香港男女生對協作解難態度的兩個維度均無顯著分別。



與OECD成員國情況相若,香港學生對協作解難「重視關係」的 <u>態度與協作解難能力呈</u>正面關係(圖表4),尤其是學生自覺 「我是一個好的聆聽者」、「我喜歡考慮不同的觀點」及「我會 考慮別人感興趣的事」,其協作解難能力更高

可是香港學生對協作解難「重視團隊」的態度與協作解難能力呈 <u>負面關係</u>,尤其是學生自覺「我發現團隊工作能提高我的效率」, 其協作解難能力愈低。 由此看來協作解難的態度上,能真誠欣賞多元觀點比借助他人的 功利態度更為可貴。

- 「重視關係」是指參與協作活動時不求自己的利益的利他精神。
- 「重視團隊」是指著重團隊工作過於單獨工作帶來的效果。



#### 家庭及家長因素

家庭因素方面,家長在子女年幼時為其安排科學活動、現時<mark>與子 女的聯繫溝通</mark>,以及給予子女情緒上的支持,均與子女的協作解 難表現息息相關。

家長在子女約十歲時為其安排科學活動(例如觀看有關科學的電視節目),對其協作解難表現有正面的影響。

家長與子女的聯繫溝通愈多(例如與子女閒談),及在情緒上給 予子女更多支持(例如當子女在校內遇到困難時予以支持),子 女的協作解難能力表現愈佳(圖表5)。

這些家長參與的影響與2016年公布的科學能力表現十分一致。



PISA協作解難			港生協作解難能力(平均分數)						
能力整體排名		性		男		女	差異		
國家式 1		別因	香港	52	523		36(有	顯著差異)	
排名	經濟體系	素	OECD*地區	<u>a</u> 48	486		29		
1	新加坡	移民因素		***	第二代	第一代	備註:		
2	日本 2			#1E	移民	移民	本地	和第二代移	
3	香港		香港	547	536	529	代移民比較,都 有顯著差異		
4	韓國		OECD*地區	显 505	482	459			
5	加拿大	家中	中有沒有	有	送	<b>そ</b> 有	差異		
6	愛沙尼亞		電腦	545	505		40(有顯著差異)		
				5-1 - 5-1 - 1 - 5 - 5 - 5 - 5 - 5 - 5 -		0.004.000			
7	芬蘭				家長因	∃素			
7	芬蘭			家長最	家長因 家長有	]素 家長較	家長很	備註:	
7 8 9	芬蘭 澳門 新西蘭			家長最 少參與	家長因 家長有 參與	] 素 家長較 多參與	家長很 多參與	備註: (呈正比,	
7 8 9 10	芬蘭 澳門 新西蘭 <u><u></u> <u></u> <u></u> <u></u> <u></u> <u></u> <u></u> <u></u> <u></u> <u></u></u>	與計	子女社交上 講通	家長最 少參與 530	家長因 家長有 參與 540	3 素 家長較 多參與 545	家長很 多參與 551	備註: (呈正比, (呈正比, 顯示非常 重要)	
7 8 9 10 11	芬蘭 澳門 新西蘭	與的 與的	子女社交上 構通 子女學術上 構通	家長最 少參與 530 542	家長因 家長有 參與 540 550	3]素 家長較 多參與 545 545	家長很 多參與 551 528	備註: (呈正比, 風示非常 重要) 註:	
7 8 9 10 11 26	芬蘭 澳門 新西蘭 楽洲 中華台北	與的 與的 與	子女社交上 講通 子女學術上 講通 子女科學活動	家長最 少參與 530 542 533	家長因 家長有 參與 540 550 542	3 家長較 多參與 545 545 549	家長很 多參與 551 528 543	備註: (呈正比, 顯示非常 重要) 註: OECD 為「經 濟合作暨發	
7 8 9 10 11 26 資料來源	芬蘭 溴門 新西蘭 1 第 千 中 中 朝 日 1 1 1 1 1 1 1 1 1 1 1 1 1	與的與的與給(家	子女社交上 構通 子女學術上 構通 子女科學活動 子女情緒支援 長報告)	家長最 少參與 530 542 533 533	家長因 家長有 參與 540 550 542 537	3 家長較 多參與 545 545 549 547	家長很 多參與 551 528 543 545	備註: (呈正比, 顯示非常 重要) 註: OECD為「經 濟合作暨發 展組織」 資料來源:	



從 PISA 的分析中,協作解難能力 Collaborative Problem Solving Skill (CPSS) 和協作解難態度 Collaborative Problem Solving Attitudes (CPSA) <重視關係及重視團 隊>,你可以看到:

- 1. 協作解難能力較高的學生 , 協作解難態度 傾向
- 2. 協作解難能力較弱的學生,協作解難態度傾向
- 為甚麼 女生的協作解難能力均較男生為佳 女生較男生具更高的重視關係指數, 但男生較女生具更高的重視團隊指數
- 為甚麼 本地學生協作解難能力顯著高於第一代及第二代 移民學生



- This theory focuses on developing content knowledge in complex domains, problem-solving and critical thinking skills, and collaboration skills.
- The theory offers a comprehensive set of instructional methods and guidelines for problem-solving and collaborative learning.



- The theory addresses four types of collaborative environments guidelines including
  - Instructor-implemented,
  - ◆Learner implemented,
  - Instructor- and Learner-implemented, and
  - Interactive methods.
- Also nine process activities are provided as instructional strategies which apply to particular phases and process during the learning event.

Specification of Theory :

**Collaborative Problem Solving (CPS)** 

a) Goals and preconditions Primary goal of the theory is to develop content knowledge in complex domains, problem-solving and critical thinking skills, and collaboration skills.

#### **Collaborative Problem Solving (CPS)**

#### b) Principles

- 1) Maximize the <u>natural collaborative process</u> of learners;
- 2) <u>Create learning environments</u> which are situated, learnercentered, integrated, and collaborative, versus ones which are decontextualized, isolated and competitive;
- 3) <u>Develop authentic, relevant learning experience</u> with regard to the content to be learned and the process by which it is learned;
- 4) Allow students <u>to learn by doing</u> as active participants in their own learning processes;

- b) Principles
  - 5) Foster the development <u>of critical thinking</u> and <u>problem-solving skills</u>;
  - 6) Encourage <u>the exploration and analysis</u> of content from multiple perspectives;
  - Acknowledge the importance of <u>rich social contexts</u> for learning;
  - 8) Cultivate <u>supportive</u>, <u>respectful relationships</u> among learners, as well as between learners and the instructor;
  - 9) Develop a desire for <u>life-long learning</u> and the skills to sustain it. (Nelson, 1999, pp. 245-246)

- c) Condition of learning
  - 1) Type of Content: <u>Heuristic tasks</u> made up of a complex system of knowledge and skills & Conceptual understandings and cognitive strategies including critical thinking, learning strategies, and metacognitive skills.
  - 2) Learning Environment encourages an open exchange of ideas and information during collaboration, experimentation, and inquiry based learning with provided well-conceived problem or project scenario.
  - 3) Self-directed learner and Instructor's coaching for group discussion and just-in-time instruction.

#### **Collaborative Problem Solving (CPS)**

d) Required media

Computer based programs or multimedia to support problem presentation and scaffold cognitive process including knowledge-representation, knowledgemodeling, information- gathering, and problem solving performance

e) Role of facilitator Facilitator can be <u>instructor</u> or <u>computer-based tools</u> (e.g., database, multimedia, Internet). Facilitator should take the instructional roles including modeling, coaching, and scaffolding.

- (f) Instructional strategies
  Process activities throughout the entire learning event as follows:
  - 1) Instructor and learners build their readiness to engage in collaborative group work
  - 2) Either the instructor or the learners form small, heterogeneous work groups, and then the groups engage in norming processes.
  - 3) Group engage in a preliminary process to define the problem they will work on.
  - 4) Each group defines what roles are necessary to accomplish the design plan and then assigns them.

- (f) Instructional strategies
  Process activities throughout the entire learning event as follows:
  - 5) The group engages in the primary, iterative CPS process
  - 6) Groups begin to finalize their solutions or projects
  - 7) The instructor and learners engage in activities to help them reflect and synthesize their experiences
  - 8) The instructor and the learners assess their products and processes when appropriate.
  - 9) The instructor and learners develop an activity to bring closure to the learning event.

- g) Assessment method
  - Evaluation of learners should be taking place during the entire learning experience, taking a variety of forms, both informal and formal (e.g., group conversation, observations of the groups at work, assessment of individual progress reports, and reports from each group' s formative evaluation and usability tests).
  - Evaluation focuses on
    - 1. learning gains (content knowledge and skills, groupprocess skills, and metacognitive strategies),
    - 2. the solutions or projects developed by each group, and
    - 3. group processes of each team.
  - The final grade should be a combination of assessments of the group project and individual contributions.

- Collaborative learning refers to an instructional method whereby students are encouraged or required to work together on problem-solving or learning tasks.
- In its ideal form the collaboration involves the mutual engagement of learners in a coordinated effort to solve a problem together or to acquire together new knowledge (Lehtinen et al., 1998).



- Collaborative learning is a method that is in line with the new conceptions of learning and opposed to the traditional 'direct transmission' model
- Learners are assumed to be passive, receptive, isolated receivers of knowledge and skills delivered by an external source (De Corte, 1996; Verschaffel et al., 1998).



- Collaborative learning is not a method because of the low predictability of specific types of interactions.
- Collaborative learning takes the form of instructions to subjects (e.g. "You have to work together"), a physical setting (e.g. "Team mates work on the same table") and other institutional constraints (e.g. "Each group member will receive the mark given to the group project").



# **Collaborative Learning**

- Qualitative learning method
- Student centered
- Respects and highlights team abilities and contributions
- Focused on the process of working together
- Student talk is stressed as a means of working together, sharing of authority, and group consensus

## **Cooperative Learning**

- Quantitative learning method
- End product is content specific
- Teacher controlled and centered
- Tasks are divided and students are only responsible for his or her own piece
- Involves competition, usually between team members
- An "I" mentality instead of "we"

Panitz, T. (1996). A definition of collaborative vs cooperative learning. Retrieved January 24, 2007, from Deliberations Web site: http://www.londonmet.ac.uk/deliberations/collaborative-learning/panitz-paper.cfm





#### Differences and Similarities between Cooperation and Collaboration

#### **Similarities**

- Both are used as a learning tool in today society to facilitate learning
- Both acquire knowledge and social skills.
- These methods involve the placing of individuals into teams

#### **Differences**

- Cooperative learning is more teacher oriented
- Collaborative learning the students are in control of their own learning
- Cooperative learning tends to facilitate competition between members

- New Knowledge
- Knowledge Building Principles
- Scardamalia (2002) identifies twelve interrelated principles of Knowledge building




#### Zone of Proximal Development Vygotsky (1978)

Zone of proximal development (Learner can do with guidance)

Learner can do unaided

Learner cannot do



The learning pyramid relates to Vygotsky's theories of learning through social interactions



#### Scardamalia (2002) Twelve interrelated principles of Knowledge building



## Knowledge Building Principles (1)

Real ideas and authentic problems

Unlike textbook problems, authentic problems in real life are ones that students really care about. In the knowledge building community, students gain understanding by producing real ideas based on authentic problems.

認識從生活中真實的問題出發 真正能引起學生關注的是生活中的真實問題,而不單是 課本中的問題。在知識建構的群 體當中,學生透過處理 真實的問題,建立深刻的想法和概念,以達至建構新知。

## Knowledge Building Principles (2)

Improvable ideas All ideas from students are treated as improvable

Students work continuously to improve the quality, coherence, and utility of ideas. The learning culture must make students feel safe and comfortable to take risks in revealing ignorance, voicing half-baked notions, giving and receiving criticism.

#### 所有的概念與想法皆可改進

學生的概念和想法皆被視為可改進的。學生需要持續改進他們的想法和概念,以提升這些想法和概念的質素。在這樣的學習過程中,學生要經歷一些挑戰,包括要勇於發表未完善的意見、要面對別人對自己的意見的批判。因此學習的文化必須讓學生感到安全,能自在地表達自己。

## Knowledge Building Principles (3)

## Idea diversity

The diversity of ideas raised by students is essential to the development of knowledge advancement. To understand an idea is to understand the ideas that surround it, including those that stand in contrast to it. Idea diversity creates a rich environment for ideas to evolve into new and more refined forms.

#### 多元化的意念與想法

學生提出**多元化的意念和想法**,正是知識進深的必要過程。 我們要了解一個概念,就必須了解所有與之相關的概念, 當中也包括與之相反的概念。一個充滿多元化的意念和想法 的學習環境,<mark>能有效促進概念的進化</mark>,達至更新和更高的層 次。

## Knowledge Building Principles (4)

#### Rise above

Through working with growingly diverse and complex problems, students sustainably improve their ideas and understanding. They eventually achieve new syntheses, more inclusive principles and higher level concepts.

#### 自覺提昇討論層次,開展更深入的討論方向

通過愈來愈多元化和複雜的討論,學生持續改進他們的想法 及對知識的理解,逐漸能綜合知識,創建出新的理論,學習 到更廣泛的原則和更高層次的概念。

## Knowledge Building Principles (5)

#### Epistemic agency

Students themselves actively find their way to knowledge advancement. They fully consider the various ideas given by the learning community and negotiate a fit between each others' ideas. They set their own learning goals and plans, be self-motivated and engage in evaluation by themselves.

#### 自覺參與主導知識建構的過程

學生主動尋找提升知識的方法。他們充分考慮知識建構群體 提出的各種意念和觀點,並互相協商尋求適切的結論。他們 自主地訂立學習目標和計劃,主動參與並作出自我評估。

## **Knowledge Building Principles (6)**

<u>Community knowledge, collective responsibility</u>

Students' contributions to shared goals of the learning community are prized and rewarded as much as individual achievements. Team members produce ideas of value to others and share responsibility for the overall advancement of knowledge in the community.

#### 共有的知識,集體對認知負責

學生對群體的共同學習目標作出貢獻。個人對群體的貢獻會 如個人的學習成就一樣,得到同等的重視和表揚。作為知識 建構群體的成員,學生提供對群體的學習有價值的意見,並共 同承擔令群體知識進升的責任。 Scardamalia (2002) Twelve interrelated principles of Knowledge building

## Knowledge Building Principles (7)

Democratizing knowledge

All individuals are invited to contribute to the knowledge advancement in the classroom and take pride in the achievement.

#### 創建新知民主化

所有學生<mark>不論成績能力參差</mark>都能參與知識提升的過程,並因 為參與創建新知而值得驕傲。

## Knowledge Building Principles (8)

Symmetric knowledge advancement

Expertise is distributed within and between communities. Symmetry in knowledge advancement results from knowledge exchange and from the fact that to give knowledge is to get knowledge.

#### 知識上的共同增長

一個知識建構群體內的各成員或各個不同的 群體都擁有各 自的專門知識。當他們將自己的知識分享和交換,就能得 著共同的知識增長。 Scardamalia (2002) Twelve interrelated principles of Knowledge building

## Knowledge Building Principles (9)

Pervasive Knowledge building

Knowledge building is not confined to particular occasions or subjects but pervades mental life— in and out of school.

不受時空限制建構新知

知識建構不受特定的情況或科目所局限。無論在校內或校外,知識的建構滲透在日常生活中。

## Knowledge Building Principles (10)

Constructive uses of authoritative sources

To support their learning, learners need to respect and understand authoritative sources to get in touch with the present state and growing-edge of knowledge with a critical attitude.

#### 有建設性而不盲目地利用權威文獻

學生需要以<mark>批判性的角度,關注和理解具權威性的文獻</mark>, 從中接觸一些知識的現狀及它們的最新發展 Scardamalia (2002) Twelve interrelated principles of Knowledge building

## Knowledge Building Principles (11)

Knowledge building discourse

Students are engaged in discourse to share, refine and transform knowledge to reach for the goal of knowledge advancement.

#### 以建構新知為目的的討論

學生參與討論不單為了分享交流,他們還要改善和革新他們的想法,達至建構新知的目的。

## Knowledge Building Principles (12)

Embedded and transformative assessment

Assessment is part of the effort to advance knowledge— it is embedded in the day-to-day learning process and used to identify problems as the learning proceeds. The community creates and engages in its own internal assessment, which is more fine-tuned and rigorous than external assessment.

評估嵌進知識建構的過程中,以提升和改進群 體為目標的
 評估是促進知識增長的重要元素。評估應包含在每天的學習
 過程中,用以識別出學習進行期間出現的問題。
 學習群體自主地設計和參與內部評估。這樣的評估比外界的
 評估更加適切和 準確。

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討論:

你是如何進行協作解難(CPS)能力的相關教學活動?

- 1. 活動性質
- 2. 分組佈置(場地設定)
- 3. 分組策略 (組員安排)

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#### **Classroom Seating Styles Educational Spatial Planning**

Seating plans for a 20x40 foot [6x12 meter] classroom with 45 chair desks, podium, table, ceiling-mounted projector and projection screen.



#### Offset Traditional Classroom



#### Advantages: Visibility, Personal Space Disadvantages: Complexity, Access, Unfamiliarity, & Instructor/Student Proximit

Sense of Place: "Network" "Diagonal Grid"

#### **Dialogue Classroom**



Advantages: Visibillity, Personal Space & Engagement Disadvantages: Complexity, Access, & Instructor/Student Proximity Sense of Place: "Conference" "Committee"

#### **Debate Classroom**



Disadvantages: Polarizing, Instructor/Studi Sense of Place: "Confrontation" "Trial"

#### Forum Classroom



#### **Oratory Classroom**





- The 'collaborative' situation is a kind of social contract, either between the peers or between the peers and the teacher (then it is a didactic contract).
- This contract specifies conditions under which some types of interactions may occur, there is no guarantee they will occur.





- For instance, the 'collaboration' contract implicitly implies that both learner contribute to the solution, but this is often not the case.
- Conversely, reciprocal tutoring (Palincsar and Brown, 1984) could be called 'a method', because subjects follow a scenario in which they have to perform particular types of interaction at particular times. (Dillenbourg (1999:5))



<u>異質分組(heterogeneous grouping)</u>

- 在教學上對於群體學生的分組,很重要的是要以學生學習的獲益為優先考量。
- 不同的分組結構對於整體情境的學習脈絡,提供不同的可能和 挑戰,也會造成學生不同的學習機會。
- 因此教師在實施分組時,應注意與教學目標作緊密連結,作彈 性適切的分組。而群體成員的組成,以及群體的活動規劃,除 了依據教學目標的指引外,若能關注於學生學習的需求,即能 把學習效能最大化。



<u>異質分組(heterogeneous grouping)</u>

整體而言,進行群體分組時,要思考的面向有三:

- 1. 要創造合作性分組或競爭性分組(或結合兩者)?
- 2. 小組規模為何
  - (是否要有個體活動、成對行動,小群體或大群體)?
- 3. 群體要作同質分組或異質分組?

在對學生進行分組時,基於許多不同因素考量,如年齡、興 趣、學業能力、社會背景、體力、學習風格等。 在小組規模方面,由於同儕互動品質與其學習成效有著正相 關的連結,因此為了使小組成員有著良好的互動效果,小組 人數不宜過多,以免有些成員被邊緣化,至於確切的小組人 數則視教學活動設計而定

<u>異質分組(heterogeneous grouping)</u>

教學上的分組方法,王岱伊在2002年指出常用的四種:

- (1) 學生自行選擇合適的組員
- (2) 隨機組隊 用抽籤或電腦選員組隊
- (3) 互補組隊 將特質不同的學生編為同一組
- (4) 平衡組隊 設定組員角色, 使每組都符合該角色分佈

教師在計畫教學的分組時,如何選擇分組依據、小組人數和分組方法,很重要的是要<mark>謹慎思考群體的構成,以及對所有學生的可能效果。</mark>

<u> 異質分組(heterogeneous grouping)</u>

- 異質分組可就學生的學習成就,或從學生本身的特質和屬性加以編組。
- 異質分組策略之一是「最大混合」(max mix)策略 小組成 員在許多層面是以最大差異的方式來組成。
- 許多學者研究指出,進行合作學習分組時,應使小組作異質性的組成;其異質性可包括三方面:學習能力和成就、學習動機和行為表現,以及學生特質。
- 把高能力和低能力學生合併一起作異質分組時,藉由高能力學生的協助和示範,引導低能力學生跨過學習障礙,因此,高能力學生的學習和參與度會提高,低能力學生的學習表現也會比獨立學習更為良好,結果使兩者同時提升其學習成效;其中同組成員須作最大差異性分組,才是最佳化的異質分組。

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# XXX XXX XXX 學校 201?



#### **Discussion:**

- Discussion on available choices and measures 學校有那些良好的案例,有關善用無線網絡環境及 移動學習裝置,配合雲端應用技術,推動電腦為本 的協作解難(CPS)能力
- Discussion on the future trend and how school and teachers could prepare for it. 將來的科技會怎樣影響學習模式? 老師要如何準備自己?

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# 如何量度學校 eLearning 發展?



 A. 設備及網絡基建
 B. 電子教材及內容

 C. 電子學習管理平台
 D.學生自主學習態度

 E. 老師教學範式轉變
 F. 學校資訊科技領導





## School areas covered with WiFi (WiFi 100 and WiFi 900A)



#### 學校流動裝置的操作系統















# 學校的 BYOD 平均班數


#### Using e-textbooks and e-resources (2015/16)



I avala

## Using e-textbooks & e-learning resources across subjects in primary schools



### Using e-textbooks & e-learning resources across subjects in secondary schools



### **Discussion:**

<u>Common hurdles in conducting traditional Collaborative</u> Learning:

- Teachers 'perspective (教學設計)
- Students 'perspective (資訊素養)





Technological Pedagogical Content Knowledge (TPACK) Framework

Effective technology integration for pedagogy around specific subject matter requires developing sensitivity to the dynamic, transactional relationship between these components of knowledge situated in unique contexts.



Integration efforts should be creatively designed or structured for particular subject matter ideas in specific classroom contexts.

into curriculum.

Mishra & Koehler (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. Teachers College Record, 108(6), 1017-1054.

科技知識

(TK)

PCK

TCK

學科

知識

(CK)

TPK

教學法

**(P**K

## (TPACK) Framework

- •學科內容知識 Content Knowledge
- •教學知識 Pedagogical Knowledge
- •科技知識 Technological Knowledge
- •教學內容知識 Pedagogical Content Knowled
- •科技內容知識 Technological Content Knowledge
- •科技教學知識 Technological Pedagogical Knowledge
- •科技教學內容知識

### Technological Pedagogical Content Knowledge Mishra & Shulma, 2005 Mishra & Koehler, 2006



Teachers 'perspective (教學設計): 課程規劃







- The phrase "curriculum planning" can mean one of two related things:
  - Micro Level: either the process of an individual teacher to build a class curriculum, or
  - Macro Level: the means through which school boards coordinate the various curricula being used by teachers in order to achieve uniform goals.



- Curriculum is basically a lesson plan that functions as a map for learning.
- Careful planning is required to ensure first that the lessons actually touch on all required topics, and also that they meet school or governmental standards of basic education.



- Curriculum planning develop well-coordinated, quality teaching, learning and assessment programs
- which build students' knowledge, skills and behaviors in the disciplines, as well as their interdisciplinary and/or physical, personal and social capacities.
- The full range of learning needs of students are addressed



Students 'perspective 學生層面: (資訊素養)

#### eLearning Strategies : Student

• Information Literacy (IL)香港學生資訊素養 2016

類別	八個素養範疇		
有效及符合道德地運 用資訊,以達致終身 學習	1	符合道德地及負責任地使用、提供和互通資訊	
一般的資訊素養能力	2	識別和定義對資訊的需求	
	3	找出和獲取相關資訊	
	4	評估資訊和資訊提供者的權威、公信力及可靠性	
	5	提取和整理資訊以及產生新意念	
資訊世界	6	能夠運用資訊科技處理資訊和建立內容	
	7	<b>認識</b> 社會上資訊提供者(例如圖書館、博物館、 互聯網)的角色和功能	
	8	認識能獲取可靠資訊的條件	



Real-time whiteboard how to use them in lesson:

- Realtimeboard (free for groups of 3 people)
- Padlet
- Whiteboard (iOS)



#### Realtimeboard: https://realtimeboard.com/

Real-time whiteboard how to use them in lesson:

Realtimeboard (free for groups of 3 people)



## Whiteboard toolkit

Use the intuitive whiteboard toolkit to create mockups and schemes, write down ideas and leave feedback on your colleagues' input.

Also **Post-it notes**. Lots of them!



## Ready to be used

Add files, images and documents from your computer and Google Drive, or explore the builtin collections and integrated libraries of icons, wireframes and other content ready to be used on your boards.



## Pre-loaded with templates

Think it's a cool concept, but don't know where to start?

Pick a couple of our hand-crafted templates to fire up your project and get a head start on any task.



#### RealtimeBoard

#### Powerful Should we put i collaboration features

#### ve're A/B testing

- Get more work done by sharing the board with colleagues, clients or friends.
- Collaborate in real-time and see all the changes instantly, or work across continents and time zones while still staying on the same page.



#### Padlet : https://padlet.com/

padlet

## Collaborate better. Be more productive.

Make beautiful boards, documents, and webpages that are easy to read and fun to contribute to.



Already using Padlet? <u>登录</u>.

学府使用

商业使用

帮助

Why Padlet

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登录

#### Padlet : https://padlet.com/



#### 1. Style

Choose a premade template or go bold with a blank slate



#### Padlet : https://padlet.com/



#### 2. Invite

Invite collaborators to add content, comment, like and make edits in real-time



#### Padlet : https://padlet.com/





#### Padlet : https://padlet.com/

	Sandra Hayes @sandrahayes Guys, checkout my new padlet!
	All Control of the second seco
Lookir	Image: Source of the sector of the
some	Encode
	My sumptuous wall Made with the help of a typing monkey
	padlet.com
	Q 2 1] 34 (Y 71

#### 4. Share 分享

Share your padlet with classmates and colleagues, friends and family, kittens and Kanye West.



## Whiteboard (iOS) : https://itunes.apple.com/us/app/whiteboard/id537780132?mt=8



Google for Education https://edu.google.com/k-12-solutions/g-suite/?modal\_active=none

**Google for Education** 

Google For Education

- Google Drive: Teaching material sharing; Document management; Cloud-based access.
- Google Docs: Co-authoring and co-construction; Knowledge building; Peer review/assessment.
- ◆ Google Forms: Data collection; Data analysis;
- Google Draw: Mind-mapping; Illustration of ideas; Knowledge Building with non-verbal elements.



#### Google for Education https://edu.google.com/k-12-solutions/g-suite/?modal\_active=none

**\*** 

## Manage your classroom with

ease

Create classes, distribute assignments, give quizzes, send feedback, and see everything in one place.

#### Ċ

#### Administer with confidence

Add students, manage devices, and configure security and settings so your data stays safe.

#### M 🔍

#### Communicate your way

Connect with email, chat, and video conference.

#### b 🗈 🗗 📥

Collaborate anywhere

Co-edit documents, spreadsheets, and presentations in real time.

**P** 31

#### Manage all your tasks

Build to-do lists, create task reminders, and schedule meetings.

I.

Google for Education

https://edu.google.com/k-12-solutions/g-suite/?modal\_active=none

- Google Drive
- Google Docs
- Google Forms
- Google Keeps













香港中文大學資訊科技教育促進中心一向致力於推動資訊科 技在學校的應用。為協助學校更有效推行通識教育及透過專 題研習提升學習效能,本中心於2006年開發了一套融合電 腦協作學習討論平台(Computer-supported Collaborative Learning)與網上遊戲的教育系統—「學習村莊」。

系統旨在透過網上討論平台、虛擬學習社群、合作工具及遊 戲任務,促進同學各學習領域知識及發展高層次思維、協作 和溝通能力。

目前「學習村莊」的版本為第二代,能同時容納數千用戶,除畫面更新外,速度與社交功能上都大有提升。







重點工作提示		
3月4日 (星期一)	進入「討論村」開始第一週工作 看資源建觀點屋 細心閱讀及觀看中央資源,和自己顏色的 資料	I BARREL COMPANY
3月7日 (星期四)	開始第二階段工作 看其他持份者觀點 建炸彈屋 對每個其他顏色的持份者,建最少一間炸 彈屋,轟炸他們的觀點。 *一般村莊會有12間炸彈屋	
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3月11日 (星期一)	開始第三階段作 回應別人炸彈屋達致大和解 在別人的炸彈屋內,回應提問,重新審視 自己的觀點,提供適當證據與論說。 同時在自己所建的炸彈屋內,作出「大和 解」	
3月14日 (星期四)	開始第四階段作 建成品超市 綜合前三階段各人的資料與論證,建立自 己的觀點與論說。	





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#### 5. Introduction of the Learning Villages System as an Example CPS



## 6. Discussion on Assignment

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#### 6. Discussion on Assignment

- After completing the course, each participant is required to design a lesson plan that utilizes the advantages of any CPS Apps/Platforms.
- •They have to prepare the preliminary ideas/elements and complete their assignment on a word (template) file.
- •The requirements of this assignment includes:
  - Choose a subject or KLA that they teach based on the curriculum in Hong Kong;
  - Design a lesson plan on either Google for Education or Microsoft 365 and state the corresponding features.



#### 6. Discussion on Assignment

	<b>ب</b> ه				-
姓名↩	陳大文↩	<b>4</b> 2	協作解難↩	Instructor- and Learner-implemented	¢
班別┩	中四₽	42	活動類型↩		
科目	通識教育科↩	<b>ب</b>	石助从土		-
協作解難↩	認識可持續發展的市區更新策略↩	42	協作解難↩	Padlet (建構知識、交流互動) ←	¢
教學活動↩	◆		工具平台🕶	Google Drive (Shared Document) 建立論點論據、分享↩	
	保密如何在經濟發現與文化保內中中十阕中 課堂前: <del>•</del>		電腦為本協作	利用網絡環境↩	÷
	同學四人一組・根據不同持份者角色作分工↔		解難帶來的好	隨時隨地進行學習↩	
	建楠个问符忉省旳諞鞰諞據↩		<b>声</b> ,		
	課堂中:↩		▶ ←	们用約工具까及工具◀	
	課堂中作互動探討 · 提出質詢 ←		電腦為本協作	輸入表達↩	¢
	▶ 課堂後: 🕶		解難帶來的限	内容質素↩	
	就不同持份者的論點論據作整合歸納・		判₄	│ お術美異→	
	給建議有關當局如何優化策略↩		ענוו		







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