學習活動問卷

● 臨場感問卷(Sense of Presence Questionnaire)

請引用: The questionnaire was modified by Hwang, Chang and Chien (2022) based on the measure proposed by Slater and Steed (2000).

Slater, M., & Steed, A. (2000). A virtual presence counter. *Presence, 9*(5), 413-434.

Hwang, G.-J., Chang, C.-C., & Chien, S.-Y. (2022). A motivational model-based virtual reality approach to prompting learners' sense of presence, learning achievements, and higher-order thinking in professional safety training. British Journal of Educational Technology. https://doi.org/10.1111/bjet.13196

1. (　) 請用 1-5 的等級來表達你在 VR 活動中親臨現場的感覺；其中 5 代表你感覺好像身處在那個現場，1 代表沒有那種感覺。
在這個活動中，我有一種「身臨其境」的感覺：(5) 非常有感覺　(1) 完全沒有

2. (　) 這樣的體驗過程中，在什麼程度上讓你有覺得所處的場景是「真實」的，而讓你幾乎忘記原來所處的真實世界。
在活動中，曾經有一些時間，與實際所在的真實環境相比，活動中的虛擬場景似乎對我來說更像是真實存在的場所：(5) 幾乎整個活動過程都有這種感覺　(1) 完全沒有這種感覺

3. (　) 當你回想你的經歷時，你認為這個虛擬場景，看起來只是像你看過的圖像，還是你曾遊覽過的地方。請按以下 5 到 1 的標準回答。
在我看來，這個虛擬場景更像是... (5)我曾遊覽過的某個地方　(1) 我看過的圖像

4. (　) 在活動過程中，虛擬體驗的場景和真實所在的場所，哪個場景令你感覺較為強烈？
我有一種較強烈的身臨其境的感覺... (5)活動中的虛擬世界　(1) 所處的真實場所

5. (　) 在體驗過程中，你是否經常想到自己其實只是站在辦公室裡穿戴虛擬設備，還是說這個虛擬場景讓你感到已在環境當中。
在體驗過程中，我經常忘記自己只是穿戴虛擬設備進行活動... (5) 大多數時候，因虛擬場景深深吸引我的注意　(1)從來沒有，因為我一直記得我只是穿戴虛擬設備進行活動。

1. Please use a scale of 1-5 to express how you felt when you were in person at the VR event; where 5 means you felt as if you were there and 1 means no such feeling.
In this activity, I had a feeling of "being there": (5) very much (1) not at all
2. The extent to which this experience makes you feel that the scene is "real" and that you almost forget the real world you are in.
There were times in the event when the virtual scene seemed more like a real place to me than the real environment I was actually in (5) Almost the entire event (1) Not at all
3. When you think back on your experience, do you think the virtual scene just looks like an image you have seen or a place you have visited. Please answer on a scale of 1 to 5 below.
To me, this virtual scene looks more like... (5) A place I have visited (1) An image I have seen
4. During the activity, which scene did you feel more strongly about, the virtual experience or the real place?
I had a stronger feeling of being there... (5) The virtual world in the activity (1) The real place where you were
5. During the experience, did you often think that you were actually standing in the office wearing the

virtual equipment, or did the virtual scene make you feel like you were already in the environment? During the experience, I often forget that I am only wearing the virtual device for the activity... (5) Most of the time, the virtual scene captures my attention (1) Never, because I always remember that I am just wearing the virtual device for the activity.

● 運算思維傾向(computational thinking tendency)

請引用: Hwang, G. J., Lee, K. C., & Lai, C. L. (2020). Trends and strategies for conducting effective STEM research and applications: a mobile and ubiquitous learning perspective. *International Journal of Mobile Learning and Organisation*. 14(2), 161-183.

運算思維傾向

1. 在處理複雜問題時，我知道如何將其分解為幾個小問題並解決每個問題。
2. 我經常可以建立一個有步驟的程序來解決複雜的問題。
3. 我很願意處理複雜的問題。
4. 我很擅長建立用來解決複雜問題的計畫。
5. 我通常使用系統性或步驟明確的方法來比較和決定我的選擇。
6. 在處理複雜的問題時，我可以輕易地分析每個步驟之間的關係及順序。

Computational Thinking

1 When dealing with a complex problem, I know how to divide it into several small problems and solve each of them.
2 I can usually develop a step-by-step procedure for solving a complex problem.
3 I enjoy dealing with complex problems.
4 I am good at developing regular plans for solving complex problems.
5 I usually use a systematic method to compare and decide the options I have.
6 I can easily capture the relations or sequence between the subtasks for solving a complex problem.

● 認知負荷 (7 點量表; 7: 非常同意, 1: 非常不同意)

Klepsch, M., Schmitz, F., & Seufert, T. (2017). Development and validation of two instruments measuring intrinsic, extraneous, and germane cognitive load. Frontiers in psychology, 8, 1997.

內在認知負荷 (intrinsic cognitive load)

ICL 1 -為了理解這學習教材內容，需要同時考慮到許多事情。
ICL 2 -這些學習教材的內容非常複雜
ICL 1 -For this learning material, many things needed to be kept in mind simultaneously
ICL 2 - This learning material is very complex

外在認知負荷 (extrinsic cognitive load)

ECL-在學習這些教材的過程中，要找到重要的資訊是很辛苦的。
ECL-這個學習教材的設計方式使得學習很不方便。
ECL-在學習這些教材的過程中，要辨識和連結重要資訊是有難度的。
ECL - It is very tiring to find important information in this study material.
ECL-The design of this learning material is not convenient for learning.
ECL - It is difficult to identify and link important information in this learning material.

增生認知負荷(Germane cognitive load)

GCL-在學習過程中，我不只嘗試理解學習內容的細節，也嘗試了解其架構。

GCL-我能夠經由學習教材的練習過程正確地理解所有內容。

GCL-這些學習教材的內容有助於我更加理解學習的主題。

GCL - I try to understand not only the details but also the structure.

GCL-I can understand everything correctly by practicing with the study material.

GCL-The content of the study material helps me to understand the topic better.

● 合作傾向、溝通傾向、解決問題傾向、後設認知察覺傾向、創造性思考傾向

Please cite the following paper if you use this measure:

Lai, C. L., & Hwang, G. J. (2014). Effects of mobile learning time on students' conception of collaboration, communication, complex problem-solving, meta-cognitive awareness and creativity. *International Journal of Mobile Learning and Organisation, 8*(3), 276-291.

合作傾向

1. 在小組活動中，我相信所有隊員都會盡最大的力來完成任務。
2. 在小組活動中，我相信我們小組會成功地合作來完成任務。
3. 當我的同伴們提出想法，我不會質疑他們的動機。
4. 當和同伴們合作時，我通常會和他們有良好的溝通。
5. 當和同伴們合作時，我們通常會將任務正確地分配給每個團隊成員。

Collaboration tendency

1. In a team activity, I believe that all of the team members will try their best to complete the task.
2. In a team activity, I believe our team will successfully collaborate to complete the task.
3. When my peers propose some ideas, I will not question their motives.
4. When collaborating with peers, I generally communicate with them well.
5. When collaborating with peers, we generally have the tasks properly assigned to each of the team members.

溝通傾向

1. 和別人說話時，我會試著讓他們有愉悅的心情。
2. 我會試圖讓他人感受到他們很重要。
3. 我會試著用熱情的語調與別人溝通。
4. 和別人說話時，我會考慮到他們的感受。
5. 我會用話語和行動支持他人。
6. 我能理解別人告訴我的事情的隱私。
7. 我待他人的誠意會如他人待我一般。

Communication tendency

1. When talking to others, I will try to make them have a good mood.
2. I will try to make other people feel that they are important.
3. I will try to communicate with others in a warm tone.
4. When talking to others, I will consider their feelings.
5. I will support others with words and actions.
6. I understand the privacy of what others have told me.

7. I treat others with the same frankness as they treat me.

問題解決傾向

1. 我相信我有能力解決我所遇到的問題。
2. 我相信我可以靠自己解決問題。
3. 我經歷過解決我所遇到的問題。
4. 當遇到問題時，我願意面對並處理。
5. 我不會逃避我所遇到的問題。
6. 我總會盡我最大的能力來解決所遇到的問題。

Problem-solving tendency

1. I believe that I have the ability to solve the problems I encounter.
2. I believe that I can solve problems on my own.
3. I have experiences of solving the problems I encounter.
4. When encountering problems, I am willing to face and deal with them.
5. I will not escape from the problems I encounter.
6. I always try my best to solve the problems I encounter.

後設認知察覺傾向

1. 我會定時檢視自己是否有達到我的目標。
2. 我會定時檢視，幫助自己了解重要的關係性。
3. 我自己會定期檢視我的認知。
4. 當我完成一個任務時，我會檢視自己達到預訂目標的程度。
5. 一旦我完成一個任務，我會詢問自己學到的是否足夠。

Meta-**Cognition** Tendency

1. I ask myself periodically if I am meeting my goal.
2. I periodically review to help me understand important relationships.
3. I find myself pausing regularly to check my comprehension.
4. I ask myself how well I accomplished my goals once I’m finished.
5. I ask myself if I learned as much as I could have once I finish a task.

創造性思考傾向

1. 我喜歡問一些別人沒想到的問題。
2. 我喜歡想像那些我想做、或我想知道的事。
3. 我喜歡想像那些從未發生在我身上的事。
4. 我喜歡做一些沒人做過的事情。
5. 我常想像自己是在故事、小說或電視節目的角色。
6. 我喜歡提出新想法，無論他們是否有用。

Creative thinking tendency

1. I like to ask some questions that others do not think of.
2. I like to imagine those things I would like to do or know.
3. I like to imagine those things that never happen to me.
4. I would like to do something that no people ever do.
5. I often image that I was the character in the stories of novels or TV programs.
6. I like to propose new ideas; no matter they are useful or not.

- **批判思考傾向 (Critical Thinking awareness)**

Please cite the following two papers if you use this measure:

The questionnaire was modified by Lin, Hwang and Hsu (2019) based on the measure proposed by (Chai et al., 2015).

Lin, H. C., Hwang, G. J., & Hsu, Y. D. (2019). Effects of ASQ-based flipped learning on nurse practitioner learners' nursing skills, learning achievement and learning perceptions. *Computers & Education, 139*, 207-221.

Chai, C. S., Deng, F., Tsai, P. S., Koh, J. H. L., & Tsai, C. C. (2015). Assessing multidimensional students' perceptions of twenty-first-century learning practices. Asia Pacific Education Review, 16(3), 389-398.

1 在學習過程中，我會去思考我所學到的是否正確。
2 在學習過程中，我會判斷呈現在我面前新資訊或證據的價值。
3 對於所學的內容，我會嘗試以不同的觀點去理解。
4 在學習過程中，我會評估不同的意見，看哪一個較合理。
5 在學習過程中，我可以判別出哪些是可以被採信的資訊。
6 在學習過程中，我會辨別出那些是有證據支持的事實。

- **訪談**

Please cite the following paper if you use this measure:

Hwang, G. J., Yang, T. C., Tsai, C. C., & Yang, Stephen J. H. (2009). A context-aware ubiquitous learning environment for conducting complex science experiments. *Computers & Education, 53*(2), 402-413.

1. 這種方式的培訓(上課)方式與你以前經歷（或預期）的方式有何不同？
   例如用行動科技引導實驗流程，和以前上課的差別在那裡？（比較有系統性？那你們覺得有效果嗎？為什麼？）
   在引導實驗過程中有系統會提供一些建議和需要核對的項目，你覺得它的用處是什麼？你會認真去看它嗎？對你有那些幫助？
2. 整體來說，你覺得這種學習方式有什麼優點？
3. 利用這種方式你覺得你獲得最多的是哪部分？學到最多的是哪部分？請舉具體的例子。
4. 這種方式有何需要改進之處（例如：系統的功能或介面設計）？請舉具體例子。
5. 你希望以後有機會再用這樣的方式學習嗎？是什麼樣的科目？為什麼？這些科目為什麼適合？
6. 你會推薦同學使用本系統或這樣的方式進行學習嗎？你覺得為什麼他們需要這樣的方式學習？或是他們會喜歡用這樣的方式學習？
7. 你會推薦老師使用本系統或這樣的方式進行教學嗎？你覺得為什麼他們需要這樣的方式教學？或是他們會喜歡用這樣的方式教學？

*黃色標示的部分必須依照實際系統的特性或導入的策略修改。

- **學習態度 (學習前後) (5 點量表：5-非常同意；1-非常不同意)**

Please cite the following paper if you use this measure:

Hwang, G. J., Yang, L. H., & Wang, S. Y. (2013), A concept map-embedded educational computer game for improving students' learning performance in natural science courses, Computers & Education, ***69***, 121-130.

1. 我覺得學習這個課程是有趣而且有價值的。
2. 我想要學習更多且觀察更多有關這個課程的內容。

3. 我覺得學習跟這個課程有關的事物是值得的。
4. 我覺得學好這個課程對我來說很重要。
5. 我覺得了解這個課程與生活環境之間的關係是重要的。
6. 我會主動搜尋更多資訊來學習這個課程。
7. 我覺得學習這個課程對每個人來說都是重要的。

Attitudes toward science learning
1. I think learning science is interesting and valuable.
2. I would like to learn more and observe more in the science course.
3. It is worth learning those things about science.
4. It is important for me to learn the science course well.
5. It is important to know the science knowledge related to our living environment.
6. I will actively search for more information and learn about science.
7. It is important for everyone to take the science course.

- **內在動機量表(Intrinsic Motivation Inventory)** (學習前後) (7 點量表：7-非常同意；1-非常不同意)

Please cite the following two papers if you use this measure:

The questionnaire was modified by Yin et al. (2021) based on the measure proposed by (McAuley et al., 1989).

Yin, J., Goh, T. T., Yang, B., & Xiaobin, Y. (2021). Conversation technology with micro-learning: The impact of chatbot-based learning on students' learning motivation and performance. *Journal of Educational Computing Research*, *59*(1), 154-177.

McAuley, E., Duncan, T., & Tammen, V. V. (1989). Psychometric properties of the Intrinsic Motivation Inventory in a competitive sport setting: A confirmatory factor analysis. Research Quarterly for Exercise and Sport, 60(1), 48–58.

興趣和樂趣

1. 當我以這種方式學習時，我在思考自己有多喜歡。
2. 這種學習方式很有趣。
3. 我認為這種學習方式非常愉悅。
4. 我非常喜歡這種學習方式。
5. 我認為這是一種有趣的學習方式。*
6. 這種學習方式有引起我的注意力。*
7. 我將這種學習方式描述為非常有趣。

緊張與壓力

8. 以這種方式學習時，我感到很緊張。*
9. 以這種方式學習時，我感到很焦慮。
10. 在這個學習過程中，我感到不太輕鬆。*
11. 當我以這種方式學習時，我很焦慮。
12. 以這種方式學習時，我感到壓力很大。

感知選擇

13. 我想我會積極使用這種學習方式。
14. 我相信這種方式學習讓我有保有選擇權。

15. 我覺得我可以選擇學習方式。*
16. 我覺得以這種方式學習是我自己的選擇。*

感知能力

17. 我認為我很擅長這種學習方式。
18. 與其他同學相比，我認為我在這種學習方式上表現得還不錯。
19. 我對這種學習方式的表現感到滿意。
20. 我在這種學習方式上非常熟練。
21. 以這種方式學習了一段時間後，我覺得自己能力提升。

感知價值

22. 我相信這種學習方式對我有一定的價值。
23. 我認為這種學習方式有助於提高我的興趣。
24. 我認為這種學習方式可以幫助我獲得知識。
25. 我願意再次使用這種學習方式，因為它對我有一定的價值。

Interest-enjoyment

1. While I was learning in this way, I was thinking about how much I enjoyed it.
2. This way of learning was fun.
3. I thought this way of learning is quite enjoyable.
4. I enjoyed this way of learning very much.
5. I thought this was an interesting way to learn.
6. This way of learning held my attention at all.
7. I would describe this way of learning as very interesting.

Tension-pressure

8. I felt nervous at all while learning in this way.
9. I felt very tense while learning in this way.
10. I was very nervous in this learning process.
11. I was anxious while learning in this way.
12. I felt pressured while learning in this way.

Perceived choice

13. I think I will actively use this learning method.
14. I believe I had some choice about learning in this way.
15. I felt like I could choose the learning method.
16. I felt like it was my own choice to learn in this way.

Perceived competence

17. I think I am pretty good at this way of learning.
18. I think I did pretty well at this way of learning, compared to other students.
19. I am satisfied with my performance in this way of learning.
20. I was pretty skilled in this way of learning.
21. After learning in this way for a while, I felt pretty competent.

Perceived value

22. I believe this way of learning could be of some value to me.
23. I think that this way of learning is useful for increasing my interest.
24. I think this learning method could help me to acquire knowledge.
25. I would be willing to use this learning method again because it has some

value to me.

- **個人自我效能 (個人學習、學習前後) (5 點量表：5-非常同意；1-非常不同意)**

Please cite the following paper if you use this measure:
Pintrich, P.R., Smith, D.A.F., Garcia, T., & McKeachie, W.J. (1991). *A manual for the use of the motivated strategies for learning questionnaire (MSLQ).* MI: National Center for Research to Improve Postsecondary Teaching and Learning. (ERIC Document Reproduction Service No. ED 338122)

1. 我相信我可以在本課程中得到優異的成績。
2. 我確信我能理解本課程中最困難的部分。
3. 我有自信能理解本課程所教授的基本觀念。
4. 我有自信能理解本課程中老師所教最複雜的部分。
5. 我有自信能在本課程的的作業和測驗上表現優異。
6. 我預期能學好本課程。
7. 我確信能精通本課程所教授的技能。
8. 考量本課程的難度、老師、和我的能力，我覺得我可以學好本課程。

Self-Efficacy for Learning and Performance
1. I believe I will receive an excellent grade in this class.
2. I'm certain I can understand the most difficult material presented in the readings for this course.
3. I'm confident I can understand the basic concepts taught in this course.
4. I'm confident I can understand the most complex material presented by the instructor in this course.
5. I'm confident I can do an excellent job on the assignments and tests in this course.
6. I expect to do well in this class.
7. I'm certain I can master the skills being taught in this class.
8. Considering the difficulty of this course, the teacher, and my skills, I think I will do well in this class.

- **群體自我效能 (合作學習、學習前後) (5 點量表：5-非常同意；1-非常不同意)**

Please cite the following paper if you use this measure:
Wang, S. L., & Lin, S. S. J. (2007). The effects of group composition of self-efficacy and collective efficacy on computer-supported collaborative learning. *Computers in Human Behavior, 23*(5), 2256-2268.

Originated from: Pintrich, P.R., Smith, D.A.F., Garcia, T., & McKeachie, W.J. (1991). *A manual for the use of the motivated strategies for learning questionnaire (MSLQ).* MI: National Center for Research to Improve Postsecondary Teaching and Learning. (ERIC Document Reproduction Service No. ED 338122)

1. 我相信我們這個小組可以在這份作業得到優異的成績。
2. 我相信透過小組的合作，能從這份作業學到技能和知識。
3. 我相信透過小組的合作，能理解這份作業最困難的部分。
4. 我相信透過小組的合作，能理解老師在這份作業所教最複雜的知識。
5. 我相信我們這個小組的成員能學到這份作業所教的基本觀念。
6. 我相信我們這個小組能將這份作業所指定的內容做好。
7. 我預期我們這個小組能在這份作業拿高分。
8. 考量這份作業的難度和我們這組的能力，我覺得在做完這份作業之後我可以學好。

Self-efficacy of group learning
1. I believe that our group can achieve a superior outcome for this learning task.
2. I believe that, via team work, we can learn the skill or knowledge from the learning task.
3. I believe that, via team work, we can understand the most difficult part in the learning task.
4. I believe that, via team work, we can learn the most complex knowledge related to the learning task taught by the teacher.
5. I believe that our team members can learn the basic concepts instructed in the learning task.
6. I believe that our group can do a good job to fulfill the requirements of the learning task.
7. I expect that our team can get a high score for this learning task.
8. By considering the difficulty of the learning task and the ability of our group, I think I can learn well after doing the learning task.

- **合作學習傾向 (合作學習、學習前後) (5 點量表：5-非常同意；1-非常不同意)**

Please cite the following paper if you use this measure:
Hwang, G. J., Shi, Y. R., & Chu, H. C. (2011). A concept map approach to developing collaborative Mindtools for context-aware ubiquitous learning. *British Journal of Educational Technology, 42*(5), 778–789.

1. 我在閱讀同學的作業或報告之後，願意提供回饋給他們參考
2. 我可以依據同學的想法或知識，提出綜合大家意見的觀點
3. 我可以接受其他同學對我提出的意見或看法，並有建設性地採納大家提供的建議
4. 我經常幫助其他同學改進他們的想法或知識
5. 我可以公開地向其他同學說明我的想法
6. 當我不懂同學的想法時，我會請他們再說明得更清楚一些
7. 我可以組織同學（例如進行任務分工），在指定的時間內，共同完成我們被交付的任務

- **對於學習模式的滿意度 (學習後) (5 點量表：5-非常同意；1-非常不同意)**

Please cite the following paper if you use this measure:
Chu, H. C., Hwang, G. J., Tsai, C. C., & Tseng, Judy C. R. (2010). A two-tier test approach to developing location-aware mobile learning systems for natural science courses. *Computers & Education, 55*(4), 1618-1627.

1. 這次的學習任務，讓我更理解學習內容
2. 這次的學習任務中，我有努力學習觀察事物的差異
3. 這次的學習任務雖然不簡單，但這個學習方式卻不難理解
4. 使用這個方式學習，我覺得比以前的學習方法更具有挑戰性和趣味性
5. 使用這個方式學習，我可以獲得一些新發現或新知識
6. 使用這個方式學習，能讓我用新的方法或是思考模式來學習
7. 使用這個方式學習，有助於我學習分辨事物的特性
8. 使用這個方式學習，有助於我觀察事物的差異
9. 使用這個方式學習，有助於我運用新的角度觀察事物

1. The mission of this learning activity makes me better understand how to identify and classify the features of the target learning objects.
2. I have endeavored to observe the differences between the target learning objects in this learning

activity.
3. The mission of this learning activity was not easy to complete, but it was easy to understand the way of learning.
4. Learning with the PDA system is more challenging and interesting than learning with the traditional approach.
5. I had new findings or knowledge about the target learning objects owing to the use of this PDA system to learn in the authentic environment.
6. I have tried new ways or thinking styles to learn owing to the use of this mobile learning system.
7. The guidance provided by this PDA system is helpful to me in learning how to identify the features of the target learning objects
8. The guidance provided by this PDA system is helpful to me in observing the differences within the target learning objects.
9. When using this PDA system, I learned how to observe the target learning objects from new perspectives.

- **認知負荷(學習後) (7 點量表：7-非常同意；1-非常不同意)**

Please cite the following paper if you use this measure:
Hwang, G. J., Yang, L. H., & Wang, S. Y. (2013), A concept map-embedded educational computer game for improving students' learning performance in natural science courses, Computers & Education, ***69***, 121-130.

心智負荷（Mental Load）- 教材難度或任務的挑戰性

1. 這個活動中的學習內容對我而言是困難的。
2. 我花了很大的心力，才能回答這個學習活動中的問題
3. 回答這個活動中的問題令我感到困擾
4. 回答這個活動中的問題令我感到挫折
5. 我沒有足夠的時間來回答這個活動中的問題

心智努力（mental efforts）- 教材呈現的格式及解說方式

6. 在這個學習活動中，教學方式或是教材內容的呈現方式對我而言比較吃力。
7. 我必須投入許多心力來完成這個學習活動或是達成這個學習活動的目標。
8. 這個學習活動的教學方式很難理解或是跟上進度。

Mental load

1. The learning content in this learning activity was difficult for me.
2. I had to put a lot of effort into answering the questions in this learning activity.
3. It was troublesome for me to answer the questions in this learning activity.
4. I felt frustrated answering the questions in this learning activity.
5. I did not have enough time to answer the questions in this learning activity.

Mental effort

6. During the learning activity, the way of instruction or learning content presentation caused me a lot of mental effort.
7. I need to put lots of effort into completing the learning tasks or achieving the learning objectives in this learning activity.
8. The instructional way in the learning activity was difficult to follow and understand.

● 科技接受度 (學習後) (5 點量表：5-非常同意；1-非常不同意)

Please cite the following paper if you use this measure:

Hwang, G. J., Yang, L. H., & Wang, S. Y. (2013), A concept map-embedded educational computer game for improving students' learning performance in natural science courses, Computers & Education, ***69***, 121-130.

學習系統認知有用性

1. 我覺得使用這樣的學習方式(或系統)讓學習活動的內容更豐富
2. 我覺得使用這樣的學習方式(或系統)對於我學習新知識很有幫助
3. 這樣的學習方式(或系統)所提供的學習機制讓我的學習過程更為順暢
4. 這樣的學習方式(或系統)可以幫助我在需要時獲得有用的資訊
5. 這樣的學習方式(或系統)可以讓我學得更好
6. 本次學習活動中，使用這樣的學習方式(或系統)比一般的電腦輔助學習更有效果

學習系統認知易用性

7. 對我而言，學習這套系統的操作並不困難。
8. 我只花費短短的時間就完全學會這套系統的使用。
9. 使用這套系統所進行的學習活動是容易理解的。
10. 我很快便學會這套系統的操作方式。
11. 本次學習活動中，使用這套系統對我來說並不困難
12. 我覺得這套系統的介面是容易使用的
13. 整體而言，本次學習活動所使用的系統是容易學習和使用的。

Usefulness

1. The learning approach enriched the learning activity.
2. The learning system was helpful to me in acquiring new knowledge.
3. The learning mechanisms provided by the learning system smoothed the learning process.
4. The learning system helped me obtain useful information when needed.
5. The learning approach helped me learn better.
6. The learning approach is more useful than the conventional computer-assisted learning approaches.

Ease of use

7. It is not difficult for me to learn to operate the learning system.
8. It only took me a short time to fully know how to use the learning system.
9. The learning activity conducted in the learning system was easy to understand and follow.
10. I quickly learned to use the learning system.
11. It was not difficult for me to use the learning system during the learning activity.
12. I felt that the interface of the learning system was easy to use.
13. To sum up, the learning system adopted in this learning activity was easy to learn and use.

● 網路學習自律表現(學習前後) (5 點量表：5-非常同意；1-非常不同意)

Please cite the following paper if you use this measure:

Barnard, L., Lan, W.Y., To, Y.M., Paton, V.O. & Lai, S.L. (2009) .Measuring self-regulation in online and blended learning environments. *The Internet and Higher Education*, 12, 1-6.

目標設定

1. 在線上課程中，我對學習任務設定了要達到的標準
2. 我不但設定長程目標(一個月或是一學期)，也設定短程目標(一天或是一週)
3. 在線上課程中，我對自己學習表現有高標準的要求
4. 在線上課程中，我設立目標以幫助自己管理學習時間
5. 我不會因為是線上課程，就降低對自己學習品質的要求

Goal setting

1. I set standards for my assignments in online courses.
2. I set short-term (daily or weekly) goals as well as long-term goals (monthly or for the semester).
3. I keep a high standard for my learning in my online courses.
4. I set goals to help me manage studying time for my online courses.
5. I don't compromise the quality of my work because it is online.

環境

1. 我會選擇學習的場所，以避免太多的干擾
2. 我會找一個覺得舒適的環境進行學習活動
3. 我知道在什麼場所對我的線上學習效果最有幫助
4. 我會選擇干擾最少時間來進行線上學習

Environment structuring

1. I choose the location where I study to avoid too much distraction.
2. I find a comfortable place to study.
3. I know where I can study most efficiently for online courses.
4. I choose a time with few distractions for studying for my online courses

任務策略

1. 在線上課程中，我會更仔細地做筆記；因為在線上課程做筆記，比在傳統學習中更重要
2. 我會朗讀在線上課程中的學習教材，以避免學習過程中的干擾
3. 我在進入聊天室或是討論室之前，會先準備好要問的問題
4. 除了課程中指定的問題，我會嘗試解決其他的問題，以熟悉課程中教導的內容

Task strategies

1. I try to take more thorough notes for my online courses because notes are even more important for learning online than in a regular classroom.
2. I read aloud instructional materials posted online to fight against distractions.
3. I prepare my questions before joining in the chat room and discussion.
4. I work extra problems in my online courses in addition to the assigned ones to master the course content.

時間管理

1. 在線上課程中，除了指定的時間，我會使用其他時間來進行學習活動；因為我知道線上課程是需要花時間的
2. 在每天或每個星期，我會盡量安排相同個學習時段，而且會注意是否有依照這些安排來進行學習。

3. 雖然不需要像以前一樣每天到學校上課，我仍然嘗試均勻的分配我每天的線上學習時間

Time management
1. I allocate extra studying time for my online courses because I know it is time-demanding.
2. I try to schedule the same time everyday or every week to study for my online courses, and I observe the schedule.
3. Although we don't have to attend daily classes, I still try to distribute my studying time evenly across days.

尋求幫助
1. 若我發現有人對於課程的內容很熟悉，我會在需要時向他請教
2. 我會和同學在線上分享遇到的問題，因此知道大家遭遇的問題是什麼，以及如何解決問題
3. 如果有必要，我會與同學面對面討論
4. 我會持續藉由電子郵件來獲得老師的幫助

Help seeking
1. I find someone who is knowledgeable in course content so that I can consult with him or her when I need help.
2. I share my problems with my classmates online so we know what we are struggling with and how to solve our problems.
3. If needed, I try to meet my classmates face-to-face.
4. I am persistent in getting help from the instructor through e-mail.

自我評估
1. 我會歸納在線上課程中的學習成果，以檢視自己對於所學內容的瞭解程度
2. 在線上學習過程中，我會問自己很多關於線上課程內容的問題
3. 在我的線上課程中，我會與透過與同學的討論，來瞭解自己的學得好不好
4. 我會與我同學討論，來瞭解我所學習的和他們有什麼不同

Self-evaluation
1. I summarize my learning in online courses to examine my understanding of what I have learned.
2. I ask myself a lot of questions about the course material when studying for an online course.
3. I communicate with my classmates to find out how I am doing in my online classes.
4. I communicate with my classmates to find out what I am learning that is different from what they are learning.

- **心流經驗 (Flow experience) (學習後) (5 點量表：5-非常同意；1-非常不同意)**

Please cite the following paper if you use this measure:
Pearce, J. M., Ainley, M., & Howard, S. (2005). The ebb and flow of online learning. *Computers in Human Behavior, 21*(5), 745-771.

1. 在這個活動過程中，所做的事都有把握，且結果都和我期望的一樣。
2. 我強烈地投入在這個活動中。
3. 我發現這個活動令人感到愉快。
4. 我完全沉浸在這個活動中。
5. 我覺得這個活動有趣。

6. 在這個活動進行中，我覺得時間過得很快。
7. 這個活動引起我的好奇心。
8. 我瞭解在這個活動中應該做的事。

1. I felt in control of what I was doing during the learning activity.
2. I was absorbed intensely by the activity
3. I found the activity enjoyable
4. I was completely immersed in this learning activity.
5. I found the activity interesting.
6. During the learning activity, time seemed to pass fast.
7. The activity excited my curiosity.
8. I knew the right thing to do in the learning activity.

- **認知風格（直覺型」與「分析型」）**

出處：

Allinson, C. W., & Hayes, J. (1996). The Cognitive Style Index: A measure of intuition-analysis for organizational research. *Journal of management Studies*, *33*(1), pp.119-136.

說明：

直覺型的人偏好自由、整體的思考方式；分析型的人偏好有邏輯、有組織結構的思考方式。

Allinson 與 Hayes (1996)的量表共有 38 題，總分為 76 分，沒有出題順序的要求。分數等於或小於平均數或中位數的為「直覺型」；大於平均數或中位數的則為「分析型」。

正向題：回答「是」得 2 分；回答「不確定」得 1 分；回答「不是」得 0 分。

反向題（*標示）：回答「是」得 0 分；回答「不確定」得 1 分；回答「不是」得 2 分。

(在施測時不應讓學生知道計分的方式及那些是反向題)

1. 依據我過去的經驗，在做決定時透過理性地思考是最實際且可行的方式。
2. 在解決問題的過程，我會瞭解該問題的各個相關細節。
3. 對於工作的程序及要求都瞭解清楚時，我做起事來會更有效率。
4. 和沒有瞭解工作內容就貿然行動的人合作時，讓我感到很辛苦。
5. 在工作過程中，我會小心遵守作業的要求與規定。
6. 對於沒有把握的事，我不會貿然採取行動。

*7. 在閱讀文章或瀏覽資料時，我通常使用概略的瀏覽方式瞭解其大意。

8. 我對於問題的瞭解通常是經由全面地分析，而不是透過一時的直覺。
9. 我會儘量讓我的工作內容具有明確的依序規則。
10. 我喜歡從事有明確步驟且邏輯清楚的工作。
11. 我很少不經思考就作決定。

*12. 我比較喜歡從事沒有規則限制的活動。

*13. 如果有充足的時間，我會嘗試從不同角度思考事情的各種可能狀況。

*14. 我覺得盡量不傷害他人的感受，對順利完成工作是很重要的。

15. 我覺得將一個問題切割成較小的問題，並分別去瞭解每個小問題，是最好的處理方式。
16. 我覺得在作決定時如果需要小心謹慎地分析細節，會太浪費時間。
17. 我覺得在做一件事之前，先仔細瞭解可能的風險，是一件很有益的事。
18. 我覺得應該盡可能透過有組織且系統化的方式來處理事情。
19. 在作結論前，我會在先瞭解事情的每一個細節。

*20. 我通常是憑直覺來做決定。
21. 我覺得小心謹慎會比貿然行動而招致失敗來得好。
22. 在作決定前，我會充分地考量所有可能影響結果的因素。
*23. 我比較喜歡和隨和且聆聽他人想法的人相處。
*24. 相較於一成不變的生活方式，我喜歡我的生活是不可預知的。
25. 我身邊的人大部認為我是具有邏輯性思考的人。
26. 我需要透過仔細的說明來充分瞭解事情。
*27. 和自動自發的人一起工作時，會使工作最有效率。
28. 我滿足於從事內容說明詳細、清楚且具條理的工作。
29. 我解決問題的方法是每次先專注於處理問題的某一部分。
*30. 我一直在找尋生活中新的體驗。
*31. 在會議中，我發言的次數通常比平時來得多。
*32. 我的直覺是做決定時最好的依據。
*33. 我是個不拘小節的人。
*34. 我下了決定後就會馬上行動執行，不會等到分析瞭解完每一細節後才執行。
*35. 我隨時準備好可以接受挑戰跟冒險。
*36. 具規則且條理的規劃，對我在工作上不見得有幫助。
*37. 我習慣於抽象思考的運思方式。
*38. 我覺得從事需要費心分析的工作，是一件令人感到疲憊的事。

- **自我價值感** (self-esteem and self-efficacy**)**

引用論文：Ching-Wen Chang, Rui Yuan, Ji-Kang Chen. (2018). Social support and depression among Chinese adolescents: The mediating roles of self-esteem and self-efficacy. *Children and Youth Services Review. 88*, 128–134

英文：

Self-esteem (α=0.85)

1. I feel that I am a person of worth.
2. I feel that I have a number of good qualities.
3. I am able to do things as well as most other people.
4. I take a positive attitude toward myself.
5. On the whole, I am satisfied with myself.

Self-efficacy (α=0.82)

6. I am confident to cope with any emergencies.
7. I am able to deal with unexpected things.
8. I am able to face the problems calmly because believe in my problem-solving skills.
9. I can think of ways to work things out when coming across troubles.
10. I can cope with it no matter what happens.

中文翻譯：

自我價值

1. 我覺得我是一個有價值的人
2. 我覺得我有一些好的個人特質
3. 我能夠做好大部分的人可以做到的事情

4. 我對自己的能力及表現持有正面的態度
5. 整體來說，我對自己感到滿意

自信心

6. 我有自信可以處理任何的緊急狀況
7. 我有能力處理無預期發生的事情（意外狀況）
8. 我能冷靜地處理問題，因為相信自己解決問題的能力
9. 當遇到麻煩時，我能想出處理的方法
10. 不管發生什麼事，我都有能力處理

● Classroom engagement (課堂參與)

引用論文: The questionnaire was modified by Elmaadaway (2017) based on the measure proposed by Jamaludin and Osman (2014).

Elmaadaway, M. A. N. (2017). The effects of a flipped classroom approach on class engagement and skill performance in a blackboard course. *British Journal of Educational Technology*. doi: doi:10.1111/bjet.12553

Jamaludin, R., & Osman, S. Z. (2014). The use of a flipped classroom to enhance engagement and promote active learning. *Journal of Education and Practice, 5*, 124–131.

【英文】

Behavioral engagement	
1	I listen carefully to everything that is said in class.
2	I ask questions about what I do not know.
3	I interact with my peers during class.
4	I strive to understand lessons during class.
5	I am alert during class.
6	I always participate in discussions with my teacher.
7	I am always eager to attend class.
8	I always complete my assignments.
9	I prefer to complete activities and assignments during class with my instructor and peers.
10	Enough time is provided during class for practice activities and discussions.
Cognitive engagement	
11	I always ask the instructor about difficult content.
12	I attempt to apply things that I learned during class.
13	I relate to my peers and discuss with them what I learned at home.
14	I strive to acquire new knowledge about the course.
15	Being familiar with the content prior to attending class motivates me and increases my engagement.
16	Preparing for lessons enables me to communicate better with my peers and the instructor.
17	Familiarizing myself with content prior to attending a lecture enables me to share what I learned with others during class.

Emotional engagement	
18	I enjoy the class.
19	The teaching method practiced by the instructor is enjoyable.
20	I enjoy the practice activities conducted during class.
21	I enjoy studying content at home.
22	I like it when the instructor asks me questions.
23	I am optimistic when I go to class with an understanding of the content.
24	Participating in class discussions boosts my confidence.
25	Solving and sharing problems during class is enjoyable.

【中文】

行為參與	
1	我仔細聆聽課堂上所說的一切。
2	我詢問我不知道的問題。
3	我在課堂上與同學互動。
4	我努力在課堂上理解課程。
5	上課時我很警覺。
6	我總是和老師一起討論。
7	我總是渴望上課。
8	我總是按時完成任務。
9	我更喜歡在課堂上和我的老師和同學一起完成活動和作業。
10	課堂上有足夠的時間進行練習和討論。
認知參與	
11	我總是問教師困難的學習內容。
12	我試圖應用在課堂上學到的東西。
13	我與同學討論在家裡學到的東西。
14	我努力獲得有關該課程的新知識。
15	在上課前熟悉內容會激勵我並增加我的參與度。
16	為課程做準備使我能夠與同學和教師更好地溝通。
17	在參加講程之前熟悉內容，使我能夠在課堂上分享我與他人學到的東西。
情感參與	
18	我享受課程。
19	教師的教學方法令人愉快。
20	我喜歡在課堂上進行的練習活動。
21	我喜歡在家學習內容。
22	我喜歡教師向我問問題。
23	當我上課時對內容有所了解，我很開心。

24	參加課堂討論可以增強我的信心。
25	在課堂上解決和分享問題是愉快的。

● 溝通焦慮(communication apprehension)

Reference:
McCroskey, J. C., & Richmond, V. P. (1988). Communication apprehension and small group communication. *Small group communication: A reader*, *5*, 405-420.

本工具涵蓋 24 題關於與其他人溝通的感受之陳述。請針對陳述標記您是否非常同意（1-SA）、同意（2-A）、未定（3-U）、不同意（4-D）或強烈不同意（5-SD），來說明每個陳述適用於您的程度。

小組討論 (group discussions)

1. 我不喜歡參加小組討論。
*2. 一般來說，我在參加小組討論時很自在。
3. 參加小組討論時，我感到緊張和不安。
*4. 我喜歡參加小組討論。
5. 與新成員進行小組討論讓我感到緊張和不安。
*6. 參加小組討論時，我很平靜、放鬆。

1. I dislike participating in group discussions.
2. Generally, I am comfortable while participating in a group discussion.
3. I am tense and nervous while participating in group discussions.
4. I like to get involved in group discussions.
5. Engaging in a group discussion with new people makes me tense and nervous.
6. I am calm and relaxed while participating in group discussions.

會議 (meetings)

7. 一般來說，當我必須參加會議時，我很緊張。
*8. 通常我在參加會議時感到冷靜和放鬆。
*9. 當被要求在會議上發表意見時，我感到平靜和放鬆。
10. 我害怕在會議上表達自己。
11. 在會議上進行交流通常會讓我感到不舒服。
*12. 在會議上回答問題時我感到放輕鬆。

7. Generally, I am nervous when I have to participate in a meeting.
8. Usually I am calm and relaxed while participating in meetings.
9. I am very calm and relaxed when I am called upon to express an opinion at a meeting.
10. I am afraid to express myself at meetings.
11. Communicating at meetings usually makes me uncomfortable.
12. I am very relaxed when answering questions at a meeting.

人際交談 (interpersonal conversations)

13. 在與新朋友進行對話時，我感到非常緊張。
*14. 我不害怕在談話中發表意見。

15. 通常我在談話中非常緊繃和緊張。
*16. 通常我在談話中非常冷靜和放鬆。
*17. 在與新朋友交談時，我感到非常放鬆。
18. 我害怕在談話中發表意見。

13. While participating in a conversation with a new acquaintance, I feel very nervous.
14. I have no fear of speaking up in conversations.
15. Ordinarily I am very tense and nervous in conversations.
16. Ordinarily I am very calm and relaxed in conversations.
17. While conversing with a new acquaintance, I feel very relaxed.
18. I'm afraid to speak up in conversations.

公開演講 (public speaking)
*19. 我不怕發表演講。
20. 演講時，我身體某些部位感到緊繃和僵硬。
*21. 在發表演講時我感到很放鬆。
22. 當我發表演講時，我的想法變得混亂。
*23. 我有可能充滿自信地發表演講。
24. 在發表演講時，我非常緊張，導致忘詞。

19. I have no fear of giving a speech.
20. Certain parts of my body feel very tense and rigid while giving a speech.
21. I feel relaxed while give a speech.
22. My thoughts become confused and jumbled when I am giving a speech.
23. I face the prospect of giving a speech with confidence.
24. While giving a speech I get so nervous, I forget facts I really know.

計分：計算四個情境的子分數－小組討論、會議、人際交談、公開演講，以及整體溝通焦慮。
*反向題

非常同意= 1 分；同意= 2 分；未定= 3 分；不同意= 4 分；非常不同意= 5 分	
四個情境	計分
小組討論	18 - (1) + (2) – (3) + (4) – (5) + (6)
會議	18 - (7) + (8) + (9) - (10) – (11) + (12)
人際交談	18 - (13) + (14) – (15) + (16) + (17) - (18)
公開演講	18 + (19) - (20) + (21) - (22) + (23) - (24)
整體溝通焦慮	小組討論 ＋ 會議 ＋ 人際交談 ＋ 公開演講

※ 在四個情境中，只要子分數高於 18 分，表示該情境有焦慮的傾向。
※ 檢視整體溝通焦慮
若分數在 83-120 之間，表示有**高**溝通焦慮傾向
若分數在 55-83 之間，表示有**中**溝通焦慮傾向
若分數在 24-55 之間，表示有**低**溝通焦慮傾向
※ 整體分數應落於 24-120 之間，在此範圍外代表計算有誤。

- **翻轉教室學習感受** (更新-3.20.2019)

請引用：The flipped learning questionnaire was modified by Lin and Hwang (2018) based on the measure proposed by Al-Zahrani (2015).

Lin, C. J., & Hwang, G. J. (2018). A learning analytics approach to investigating factors affecting EFL students' oral performance in a flipped classroom. *Educational Technology & Society*, *21*(2), 205-219.

Al-Zahrani, A. M. (2015). From passive to active: The impact of the flipped classroom through social learning platforms on higher education students' creative thinking. *British Journal of Educational Technology*, *46*(6), 1133-1148.

內容豐富性 (1-5 題) Content

1. 本課程的教學方式（課前線上影片自學活動及課堂中的練習）讓我獲得反覆練習的機會。
2. 本課程的教學方式提供我接觸多元學習資源（課程內容及相關資訊）的機會。
3. 本課程的教學方式及活動內容幫助我學會運用多樣化的網路學習資源。
4. 本課程的教學方式及活動內容有助於增加我學習的經驗。
5. 本課程的教學方式及活動內容幫助我將所學的理論與生活經驗結合。

溝通有用性 (6-8 題) Communication

6. 本課程的教學方式及活動內容，使我更知道如何與同學及教師互動與合作。
7. 本課程的教學方式及活動內容增進了我與教師的互動。
8. 本課程的教學方式及活動內容增進我與同儕之間的溝通。

學習成就面 (9-11 題) Performances

9. 本課程的課前線上學習模式及課堂的活動讓我體驗如何管理自主學習。
10. 本課程的教學方式及活動內容幫助我發展自我解決問題的能力。
11. 本課程的課前線上學習模式及課堂活動設計方式幫助我有效參與學習活動。

學習興趣面 (12-14 題)Interests

12. 我很投入並享受本課程的教學方式。
13. 相較於傳統教學方式，我更喜歡本課程的教學方式及活動內容。
14. 本課程的教學方式及活動內容對於我個人的學習很有幫助。

Students' general views about the flipped classroom

1 The flipped classroom offers me the opportunity to review the lectures as many times as I need
2 The flipped classroom offers me 24/7 access to the online course tools and materials
3 The flipped classroom helps me to use various e-learning resources
4 The flipped classroom helps me to enrich my learning experience
5 The flipped classroom helps me to connect theory with practice in real life
6 The flipped classroom helps me to effectively cooperate with my classmates and colleagues
7 The flipped classroom facilitates more communication between me and my teacher
8 The flipped classroom helps me to effectively participate in the learning activities
9 The flipped classroom enables me to manage my own learning activities
10 The flipped classroom helps me to develop my problem-solving skills
11 The flipped classroom facilitates more communication between me and my classmates
12 The flipped classroom is a very enjoyable approach
13 I prefer the flipped classroom over the traditional lectures
14 The flipped classroom facilitates my personalized learning

● 科學學習方法

Please cite the following paper if you use this measure:

Lee, M. H., Johanson, R. E., & Tsai, C. C. (2008). Exploring Taiwanese high school students' conceptions of and approaches to learning science through a structural equation modeling analysis. Science Education, 92(2), 191–220.

The overall Cronbach's α value is .89. The Cronbach's α value for deep motive is .90, it is .89 for deep strategy, .84 for surface motive, and .84 for surface strategy.

深層動機(8 題)

1. 當我學習科學的相關科目時，有時我會覺得非常快樂與滿足。
2. 當我在學科學相關科目中時，我總是對於這些內容感到很有興趣。
3. 因為覺得很有興趣的關係，因此我非常努力的學習科學的相關科目。
4. 我總是非常期待上科學相關科目的課。
5. 我會利用空閒的時間，找出更多在科學相關科目中已經討論過而且我自己也感到有興趣的相關主題內容。
6. 當我要上科學相關科目的課時，我的腦中總是有很多問題等待解答。
7. 即使不在科學相關科目的課堂上，我發現自己的腦中還會繼續想著這些課程中相關的內容。
8. 我喜歡自己下功夫研究科學相關科目的內容，好讓我自己可以得到一些結論，而這樣會讓我感到很滿意。

深層策略(6 題)

9. 當我在學習科學相關科目時，我會試著將所學到的內容連結到另外一單元或科目。
10. 當我在學習科學相關科目時，我喜歡自己創造一個理論以幫助我將一些零散的內容歸結在一起。
11. 當我在學習科學相關科目時，我會試著找出所學到的內容之間的相關性。
12. 當我學習科學相關科目中的一些新的內容時，我會將這些內容跟以前我學過的內容做連結。
13. 當我閱讀科學相關科目的課本裡面的內容時，我會試著理解這些內容的意義。
14. 當我在學習科學相關課程時，我會要求自己盡量去理解這些課程的內容。

淺層動機(5 題)

15. 當我在科學相關科目的考試中考不好時，我會擔心我在下一次考試中的表現。
16. 雖然我都會很努力準備科學相關科目的考試，但是我還是會擔心考不好。
17. 我會擔心在科學相關科目課堂上的表現不符合老師的期待。
18. 不管我喜不喜歡，我知道在科學相關科目上有好的表現可以幫助我在未來找到一個理想的工作。
19. 我很想要在科學相關科目中得到好的成績，以便於自己以後可以找到一個很好的工作。(刪，與 18 重複)

20. 我會想要在科學相關科目中有好的表現，好讓家人及老師感到高興。

淺層策略(5 題)

21. 在學習科學相關科目時，如果考試中不會出現的內容對我而言是沒有意義的。
22. 在學習科學相關科目時，只要我覺得自己的準備已經足夠應付考試，我會儘量減少研讀這些內容的時間，因為還有太多其他我感到興趣的事可以做。
23. 一般來說，在學習科學相關科目時，我都會特別區分哪些內容值得我花時間在上面，因為我覺得不需要在學習科學相關科目上多花時間和精神。
24. 在學習科學相關科目時，為了要通過很多的相關考試，加上要學習的單元太多了，因此我們不必對每個單元的內容太熟悉，深入瞭解每一個單元的內容是沒有好處的。
25. 我覺得如果要在科學相關科目的考試中得高分，最好的方法就是將類似問題的答案背起來。

計算思維測驗 (電腦課程適用) Computational thinking test

Please cite the following paper if you use this measure:

Pérez-Marín, D., Hijón-Neira, R., Bacelo, A., & Pizarro, C. (2020). Can computational thinking be improved by using a methodology based on metaphors and scratch to teach computer programming to children? *Computers in Human Behavior*, *105*, 105849.

答對得 1 分，滿分 12 分

#	Area of knowledge	題目_英文	題目_中文
1	Program, programming, sequence(程式、程序、順序)	1. What is a computer program? Can you give an example?	什麼是電腦程式？你能舉個例子嗎？
		2. What is programming?	什麼是電腦程式設計？
2	Output(輸出)	3. Do you believe that the computer can show information on screen? How?	您認為電腦可以在螢幕上顯示資訊嗎？如何顯示？
		4. Can you write approximately the instruction so that the computer shows “Hello!” on the screen?	您能寫大概的指令，以便在電腦螢幕顯示「 你好」嗎？
2	Input(輸入)	5. Do you believe that you can type in information to the computer from the keyboard? How?	您相信你可以從鍵盤輸入資訊嗎？如何做到？
		6. Can you write approximately the instruction to save the value “5” typed by a user?	您能編寫大概的電腦指令，把使用者在鍵盤輸的 「5」這個值保存起來嗎？
1	Memory(記憶)	7. Do you believe that the computer has a memory? What do you think it is for?	您相信電腦有記憶嗎？你認為這樣是為了什麼？

		8. If the computer has a memory and can save data, do you think that a computer program can modify it? Can you give an example?	如果電腦有內存記憶體並且可以儲存資料，您認為是否可以透過電腦程式來修改它？您能舉個例子嗎？
3	Conditionals(條件式)	9. Do you believe that the computer can make decisions? How?	您相信電腦可以做條件判斷嗎？如何做到？
		10. If your answer to previous question 9 has been affirmative, can you write the program instructions to make a decision?	如果上一個問題您的回答是肯定的，您是否可以寫一個可以做條件判斷的電腦程式指令？
4	Loops(迴圈)	11. Do you believe that the computer can repeat the same task several times? How?	您相信我們可以要求電腦執行多次相同的指令嗎？如何達到？
		12. If your answer to previous question 11 has been affirmative, can you write the instructions to repeat an instruction twice	如果上述問題是肯定的，您是否可以寫一個可重複兩次指令的程式？

- **論證信任度量表(Justification belief measures)**

請引用: Bråten, I., Ferguson, L. E., Strømsø, H. I., & Anmarkrud, Ø. (2013). Justification beliefs and multiple-documents comprehension. European Journal of Psychology of Education, 28(3), 879-902.

中文:

個人論證

1. 每個人對於自然科學都有獨特的觀點。
2. 每個人對於自然科學都有不同的看法，因為不存在完全正確的答案。
3. 關於自然科學的知識只是個人的觀點，沒有一成不變的事實。

權威論證

4. 如果自然科學老師說某件事是正確的，那我就相信它。
5. 我相信我在自然科學課上學到的一切知識都是正確的。
6. 自然科學課本上寫的知識都是正確的。
7. 如果一個科學家說某件事是事實，那我就相信它。
8. 當我讀到一些基於科學調查的關於自然科學的文章時，我會相信它是正確的。
9. 我相信基於科學研究的主張。

多重來源論證

10. 為了能夠相信自然科學文本中的理論主張，我必須檢查其中的各種知識來源。
11. 為了發現關於自然科學的文本中不正確的理論主張，檢查其中幾個資訊的來源是很重要的。
12. 在我核實其中至少一個來源的資訊之前，我永遠無法確信自然科學文本中的理論主張。
13. 僅僅一個來源的資訊永遠不足以決定某個自然科學主張是正確的。
14. 要判斷我讀到的關於自然科學的理論是否正確，我必須檢查它是否與我讀到或聽到的關於自然科學的其他的知識相一致。

英文:

Personal justification

1. What is a fact in natural science depends on one's personal views.
2. Everyone can have different opinions about natural science, because no completely correct answers exist.
3. Knowledge about natural science is only personal opinion – there are no facts.

Justification by authority

4. If a natural science teacher says something is correct, then I believe it.
5. I believe that everything I learn in natural science class is correct.
6. Things that are written in natural science textbooks are correct.
7. If a scientist says that something is a fact, then I believe it.
8. When I read something about natural science that is based on scientific investigations, then I believe that it is correct.
9. I believe in claims that are based on scientific research.

Justification by multiple sources

10. To be able to trust knowledge claims in natural science texts, I have to check various knowledge sources.
11. To detect incorrect claims in texts about natural science, it is important to check several information sources.
12. I can never be sure about a claim in natural science until I have checked it with at least one other source.
13. Just one source is never enough to decide what is right in natural science.
14. To decide whether something I read about natural science is correct, I have to check whether it is in accordance with other things I have read or heard about natural science.