

# NTHU Learning Sciences and Technologies

## 學習領域之研究議題探討

(暫擬課綱)

Spring 2024, 3 credits, 中文授課

<https://elearn.nthu.edu.tw/course/view.php?id=24677>

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<https://nthuilst.wixsite.com/suychen/projects>

Time: Wednesday, 5, 6, 7 Location: Room 409, General Building II

### Course Description

以心理學、教育學和社會學為多元視角，以課堂討論為方法，以高度被引用之論文及最新發展主題為媒介，此課程期待從研究社群觀點來探討學習及學習科技的重要議題。在這個版本課綱中，討論的議題包括:和 academic achievement 以及 learning engagement 相關因素、self-regulated learning、self-directed learning、game-based learning、Metaverse and learning、Social robotics and Chatbot for learning、Generative AI and ChatGPT for learning 等;但這些只是暫擬提供參考的課程單元和論文選單，實際課堂內容所有權在課程成員，同學可以在開學第二周課程前提供自選論文，第三次課程老師將提供新版課綱，包括各週之單元、論文、報告同學等細節。每週以兩到三篇論文為原則，每篇論文導讀的時間配置，包括 2/3 的時間進行論文內容分享(presentation)以及 1/3 時間進行問題回應(response & leading discussion)。換言之，課堂其他成員會在上課前一天中午前提供隔日論文的瀏覽心得/提問，報告者得將這些提問/心得納入討論帶領之中。課程中也將安排一到兩次單元拜訪相關實驗室。

### Course Goals

1. 共同探索當代教育情境裡 學習和學習科技領域的重要議題
2. 建構探究自身研究興趣及同儕相互支持的學習社群
3. 協助發展在有興趣的研究領域中找到重要論文/作者作為起步的能力
4. 協助瞭解學術社群的運作機制

本課程鼓勵學生利用 AI 進行協作或互學，以提升本門課產出品質。根據清華大學公布之「大學教育場域 AI 協作、共學與素養培養指引」，本門課程採取有條件開放，以下說明如何使用生成式 AI 於課程產出: 學生須於課堂作業或報告中的「標題頁註腳」或「引用文獻後」簡要說明如何使用生成式 AI 進行議題發想、文句潤飾或結構參考等使用方式。相對地，本門課授課教材或學習資料若有引用自生成式 AI，教師也將在投影片或口頭標注。

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### Tentative schedule, topic and readings

Week	Date	Topic
1	2/21	Introduction
3	3/6	Academic achievement & Learning engagement
4	3/13	Emergent technologies and Learning- Generative AI
5	3/20	Academic achievement
6	3/27	Learning engagement
8	4/10	Self-regulated learning
9	4/17	Self-directed learning
10	4/24	Game-based learning
11	5/1	Metaverse and education
12	5/8	Social robotics and Chatbot for learning
13	5/15	Social robotics and Chatbot for learning
14	5/22	Generative AI and learning
15	5/29	ChatGPT and learning
16	6/5	Final Report Presentation

#### **Week 3 (3/6)**

##### **Academic achievement & Learning engagement**

\* What are the psychological correlates of academic achievement?

\* What is learning engagement?

1. Richardson, M., Abraham, C., & Bond, R. (2012). Psychological correlates of university students' academic performance: A systematic review and meta-analysis. *Psychological Bulletin*, 138(2), 353–387. (cited by 3490)
2. Kahu, E.R. (2013). Framing student engagement in higher education. *Studies in Higher Education*, 38 (5), 758-773. (cited by 1917)

#### **Week 4 (3/13)**

##### **Emergent technologies and Learning- Generative AI**

\* How emergent technologies (e.g. ChatGPT, Midjourney) might have impact on learning and education?

#### **Week 5 (3/20)**

##### **Academic achievement**

\* How researchers examine learning and academic achievement from the lens of psychology, sociology, teacher education, and neuroscience?

3. Voyer, D., & Voyer, S. D. (2014). Gender differences in scholastic achievement: A meta-analysis. *Psychological Bulletin*, 140(4):1174-204. (cited by 1276)

4. Park, H.; Buchmann, C.; Choi, J. and Merry, J. J. (2016). Learning beyond the school walls: Trends and implications. *Annual Review of Sociology*, 42, 231-252. (cited by 177)
5. Kunter, M., Klusmann, U., Baumert, J., Richter, D., Voss, T., & Hachfeld, A. (2013). Professional competence of teachers: Effects on instructional quality and student development. *Journal of Educational Psychology*, 105(3), 805–820 (cited by 1385)
6. Thomas, M. S. C., Ansari, D., & Knowland, V. C. P. (2019). Annual research review: Educational neuroscience: Progress and prospects. *Journal of Child Psychology and Psychiatry*, 60(4), 477–492. (cited by 159)
7. Mason, L., Zaccoletti, S., Scrimin, S., Tornatora, M. C., Florit, E., & Goetz, T. (2020). Reading with the eyes and under the skin: Comprehending conflicting digital texts. *Journal of Computer Assisted Learning*, 36(1), 89-101.

### **Week 6 (3/27)**

#### **Learning engagement**

\* What is learning engagement? How different teacher-related factors are contributing to learning achievement and to learning motivation? What is the difference between actual learning and feelings of learning? And how do we look at an example regarding huge gap between educational belief of teachers and empirical support from researchers?

8. Deslauriers L, McCarty LS, Miller K, Callaghan K, & Kestin G. (2019). Measuring actual learning versus feeling of learning in response to being actively engaged in the classroom. *Proceeding of the National Academy of Science of the United State of America*, 116(39), 19251-19257. (cited by 650)
9. Hamre, B. K., Pianta, R. C., Downer, J. T., DeCoster, J., Mashburn, A. J., Jones, S. M., ... & Brackett, M. A. (2013). Teaching through interactions: Testing a developmental framework of teacher effectiveness in over 4,000 classrooms. *The Elementary School Journal*, 113(4), 461-487. (cited by 708)
10. Seligman, M. E. P.; Ernst, R. M.; Gillham, J.; Reivich, K.; & Linkins, M. (2009). Positive education: Positive psychology and classroom interventions. *Oxford Review of Education*, 35(3) p293-311. (cited by 2634)
11. Wang, M.; Eccles, J. S. (2012). Social support matters: Longitudinal effects of social support on three dimensions of school engagement from middle to high School. *Child Development* 83(3), 877-895. (cited by 1167)
12. Pashler, H., McDaniel, M., Rohrer, D., & Bjork, R. (2008). Learning Styles: Concepts and Evidence. *Psychological Science in the Public Interest*, 9(3), 105–119. (cited by 3289)

### **Week 8 (4/10)**

#### **Self-regulated learning**

\* How different approaches look at learning autonomy and effective learning? How to support

self-regulated learning?

13. Panadero, E. (2017). A review of self-regulated learning: Six models and four directions for research. *Frontiers in Psychology*, 8, 422. (cited by 1353)
14. Bjork, R.A., Dunlosky, J., & Kornell, N. (2013). Self-regulated learning: beliefs, techniques, and illusions. *Annual Review of Psychology*, 64, 417-44. (cited by 1409)
15. David W. Putwain, Laura J. Nicholson & Jenna L. Edwards (2016) Hard to reach and hard to teach: Supporting the self-regulation of learning in an alternative provision secondary school. *Educational Studies*, 42(1), 1-18 (cited by 28)
16. Wong, J., Baars, M., Davis, D., Van Der Zee, T., Houben, G. J., & Paas, F. (2019). Supporting self-regulated learning in online learning environments and MOOCs: A systematic review. *International Journal of Human-Computer Interaction*, 35(4-5), 356-373. (cited by 345)
17. Kizilcec, R. F., Pérez-Sanagustín, M., & Maldonado, J. J. (2017). Self-regulated learning strategies predict learner behavior and goal attainment in Massive Open Online Courses. *Computers & Education*, 104, 18–33. (cited by 725)

## **Week 9 (4/17)**

### **Self-directed learning**

\*What is the difference between self-regulated learning and self-directed learning? How to support self-directed learning?

18. Saks, K., & Leijen, L. (2014). Distinguishing Self-directed and Self-regulated Learning and Measuring them in the E-learning Context. *Procedia - Social and Behavioral Sciences*, 112, 190-198. (cited by 289)
19. Grow, G. O. (1991). Teaching learners to be self-directed. *Adult education quarterly*, 41(3), 125-149. (cited by 2096)
20. Beckers, J., Dolmans, D., & Van Merriënboer, J. (2016). e-Portfolios enhancing students' self-directed learning: A systematic review of influencing factors. *Australasian Journal of Educational Technology*, 32(2), 32-46. (cited by 139)
21. Chen, C. H., Chen, K. Z., & Tsai, H. F. (2022). Did Self-Directed Learning Curriculum Guidelines Change Taiwanese High-School Students' Self-Directed Learning Readiness? *The Asia-Pacific Education Researcher*, 31(4), 409-426. (cited by 4)

## **Week 10 (4/24)**

### **Game-based learning**

\*Game-based learning as an effective tool

22. Jan L. Plass, Bruce D. Homer & Charles K. Kinzer (2015) Foundations of game-based learning. *Educational Psychologist*, 50(4), 258-283 (cited by 983)
23. Qian, M., & Clark, K. R. (2016). Game-based Learning and 21st century skills: A review of

- recent research. *Computers in Human Behavior*, 63, 50–58. (cited by 893)
24. Krath, J.; Schürmann, L.; von Korfflesch, H.F. (2021). Revealing the theoretical basis of gamification: A systematic review and analysis of theory in research on gamification, serious games and game-based learning. *Computers in Human Behavior*, 125, 106963 (cited by 78)
  25. Swacha, J. (2021). State of research on gamification in education: A bibliometric survey. *Education Sciences*, 11(2), 69. (cited by 56)
  26. Acquah, E., & Katz, H. (2020). Digital game-based L2 learning outcomes for primary through high-school students: A systematic literature review. *Computers and Education*, 143, 103667 (cited by 38)
  27. Hassan, A., Pinkwart, N., & Shafi, M. (2021). Serious games to improve social and emotional intelligence in children with autism. *Entertainment computing*, 38, 100417. (cited by 14)
  28. Tlili, A. et al., (2021). A Smart Collaborative Educational Game with Learning Analytics to Support English Vocabulary Teaching. *International Journal of Interactive Multimedia and Artificial Intelligence*, Vol. 6(6), 215-224.

## **Week 11 (5/1)**

### **Metaverse and education**

\* What is Metaverse, and its relationship with education?

29. Lee, L.-H., et al. (2021). All one needs to know about metaverse: A complete survey on technological singularity, virtual ecosystem, and research agenda. *ArXiv*, vol./2110.05352 (cited by 180)
30. Park, S. M., & Kim, Y. G. (2022). A Metaverse: taxonomy, components, applications, and open challenges. *IEEE Access*. (cited by 143)
31. Lee, L. H., Lin, Z., Hu, R., Gong, Z., Kumar, A., Li, T., ... & Hui, P. (2021b). When creators meet the metaverse: A survey on computational arts. *arXiv preprint arXiv:2111.13486*. (cited by 21)
32. Mitra, D. S. (2023). Generative AI and Metaverse: companionship and assisted living for elderly people. Available at SSRN 4489358.
33. Hwang, G. J., & Chien, S. Y. (2022). Definition, roles, and potential research issues of the metaverse in education: An artificial intelligence perspective. *Computers and Education: Artificial Intelligence*, 3, 100082.

## **Week 12 (5/8) & Week 13 (5/15)**

### **Social robotics & Chatbot for learning**

\* Social robots as emergent technologies for learning

34. Belpaeme, T., Kennedy, J., Ramachandran, A., Scassellati, B., & Tanaka, F. (2018). Social

- robots for education: A review. *Science Robotics*, 15;3(21): eaat5954. (cited by 711)
35. van den Berghe, R.; Verhagen, J.; Oudgenoeg-Paz, O.; van der Ven, S.; Leseman, P. (2019). Social robots for language learning: A review. *Review of Educational Research*, 89 (2), 259-295 (cited by 167)
36. Tlili, A., Lin, V., Chen, N.-S., Huang, R., & Kinshuk. (2020). A Systematic Review on Robot-Assisted Special Education from the Activity Theory Perspective. *Educational Technology & Society*, 23 (3), 95-109. (cited by 12)
- \* Chatbot as emergent technologies for learning
37. Zhang, Z., Xu, Y., Wang, Y., Yao, B., Ritchie, D., Wu, T., ... & Li, T. J. J. (2022, April). Storybuddy: A human-ai collaborative chatbot for parent-child interactive storytelling with flexible parental involvement. In *Proceedings of the 2022 CHI Conference on Human Factors in Computing Systems* (pp. 1-21).
38. Xu, Y., He, K., Vigil, V., Ojeda-Ramirez, S., Liu, X., Levine, J., ... & Warschauer, M. (2023, June). "Rosita Reads With My Family": Developing A Bilingual Conversational Agent to Support Parent-Child Shared Reading. In *Proceedings of the 22nd Annual ACM Interaction Design and Children Conference* (pp. 160-172).
39. Fryer, L. K., Ainley, M., Thompson, A., Gibson, A., & Sherlock, Z. (2017). Stimulating and sustaining interest in a language course: An experimental comparison of Chatbot and Human task partners. *Computers in Human Behavior*, 75, 461–468. (Cited by 193)
40. Fryer, L. K., Nakao, K., & Thompson, A. (2019). Chatbot learning partners: Connecting learning experiences, interest and competence. *Computers in Human Behavior*, 93, 279–289. (cited by 139)
41. Huang, W., Hew, K. F., & Fryer, L. K. (2022). Chatbots for language learning—Are they really useful? A systematic review of chatbot-supported language learning. *Journal of Computer Assisted Learning*, 38(1), 237-257. (cited by 26)
42. Jeon, J., Lee, S., & Choe, H. (2023). Beyond ChatGPT: A conceptual framework and systematic review of speech-recognition chatbots for language learning. *Computers & Education*, 104898.
43. Birenbaum, M. (2023). The Chatbots' Challenge to Education: Disruption or Destruction? *Education Sciences*, 13(7), 711.
44. Seo, W., Yang, C., & Kim, Y. H. (2023). ChaCha: Leveraging Large Language Models to Prompt Children to Share Their Emotions about Personal Events. *arXiv preprint arXiv:2309.12244*.
45. Zheng, Z., Liao, L., Deng, Y., & Nie, L. (2023). Building Emotional Support Chatbots in the Era of LLMs. *arXiv preprint arXiv:2308.11584*.
46. Liu, J. M., Li, D., Cao, H., Ren, T., Liao, Z., & Wu, J. (2023). ChatCounselor: A Large Language Models for Mental Health Support. *arXiv preprint arXiv:2309.15461*.

## **Week 14 (5/22) Generative AI and learning**

## **Week 15 (5/29) ChatGPT and learning**

47. Generative AI HAI Perspectives

<https://hai.stanford.edu/generative-ai-perspectives-stanford-hai>

48. FLI Policymaking In The Pause

<https://futureoflife.org/open-letter/pause-giant-ai-experiments/>

49. Eloundou, T., Manning, S., Mishkin, P., & Rock, D. (2023). Gpts are gpts: An early look at the labor market impact potential of large language models. arXiv preprint arXiv:2303.10130.

50. Chen, L., Chen, X., Wu, S., Yang, Y., Chang, M., & Zhu, H. (2023). The future of chatgpt-enabled labor market: A preliminary study. arXiv preprint arXiv:2304.09823.

51. Sohail, S. S., Farhat, F., Himeur, Y., Nadeem, M., Madsen, D. Ø., Singh, Y., ... & Mansoor, W. (2023). The future of gpt: A taxonomy of existing chatgpt research, current challenges, and possible future directions. *Current Challenges, and Possible Future Directions*

52. Kasneci, E., Seßler, K., Küchemann, S., Bannert, M., Dementieva, D., Fischer, F., ... & Kasneci, G. (2023). ChatGPT for good? On opportunities and challenges of large language models for education. *Learning and Individual Differences*, 103, 102274.

53. Rudolph, J., Tan, S., & Tan, S. ChatGPT: Bullshit spewer or the end of traditional assessments in higher education? *Journal of Applied Learning and Teaching*, 6(1).

54. Grassini, S. (2023). Shaping the future of education: exploring the potential and consequences of AI and ChatGPT in educational settings.

55. Lo, C. K. (2023). What is the impact of ChatGPT on education? A rapid review of the literature. *Education Sciences*, 13(4), 410.

56. Kung, T. H., Cheatham, M., Medenilla, A., Sillos, C., De Leon, L., Elepaño, C., ... & Tseng, V. (2023). Performance of ChatGPT on USMLE: Potential for AI-assisted medical education using large language models. *PLoS digital health*, 2(2), e0000198.

## **Week 16 (6/5)**

Final Report Presentation

### **Evaluation**

1. Presentation and Leading Discussion 45 %

Everyone must select three articles from the above class reading list and conduct three paper presentations and leading discussions. When it's your turn to be the leader, please read through reflection notes posted by classmates on eLearn before the class and incorporate those ideas into your presentations and discussions. Since this course will be largely discussion-based, a traditional "seminar-like" paper presentation will not be the preference. Instead, please prepare it in a way that allows the class to participate and

exchange ideas with a high engagement rate.

(Self-selected articles are welcomed, class reading list and time schedule might be adjusted based on class discussion, and final syllabus provided at the third week.)

2. Reflection notes and classroom participation 20% (at least 10 posts)

Everyone must post reflection notes about the assigned reading articles of that week on eLearn 24 hours before the next class. It's not necessary to be very insightful or creative; however, it must manifest that you have read the paper and done the hard work necessary.

3. Final project: literature review or research proposal 35%