Cluster	Subject Title	Instructor	Cr	Semester
A-P	Affective dimensions of ICT-supported and STEM education	Prof. Silvia Wen-Yu Lee Prof. Jyh-Chong Liang	2	Winter 2024

Subject Description

This course explores the affective dimensions that play a pivotal role in ICT-supported and STEM education. The focus is placed on the underlying emotional and psychological constructs that influence the learning process, including conceptions of learning, motivations, self-efficacy in science and programming, engagement, and the emotions associated with learning.

Objective

- Understand and articulate the key concepts and constructs of affections in learning.
- Recognize and evaluate the significance of emotions, motivations, self-efficacy, and engagement in the STEM and ICT-supported learning environments.
- Engage in knowledge-building activities, especially using tools like the Knowledge Forum, to deepen their understanding of the course material.
- Demonstrate proficiency in literature searching and critically evaluate sources pertinent to affective dimensions in education.

Leaning Method

- **Lecture:** Direct instruction and dissemination of core concepts by the instructor.
- **Small Group Discussion:** Collaborative sessions where students discuss and dissect course material in a more intimate setting.
- **Knowledge Building Activity:** Hands-on activities, especially using tools like the Knowledge Forum, to allow students to construct and expand their knowledge.
- **Report and Feedback:** Students will regularly be tasked to present their findings and understandings, receiving constructive feedback from both peers and the instructor.

Content

- **Conceptions of Learning:** Exploring how individual beliefs and views about learning can influence the learning process, shaping both challenges and opportunities.
- **Approaches to learning and motivations:** Understanding how motivations play out specifically in technology-driven and STEM learning environments.
- **Self-efficacy:** Delving into how learners perceive their abilities in scientific domains and the factors that enhance or hinder this perception. Examining the challenges and opportunities in building confidence and belief in one's capabilities within the realm of programming and coding.
- **Engagement:** Understanding the cognitive, behavioral, and emotional facets of engagement. Exploring the unique dynamics of maintaining and enhancing engagement in online and technology-supported environments.
- **Learning Emotions and Situational Interests:** Recognizing the range of emotions, from positive (e.g., joy, interest) to negative (e.g., frustration, anxiety), that learners can experience. Introduction to the concept and its distinction from individual interest. Understanding how emotions and situational interests can either enhance or impede learning outcomes and retention.
- **Self-regulated Learning:** Exploring how learners actively manage and direct their own educational experiences. Investigating the challenges and opportunities in fostering personal learning goals, monitoring comprehension, and adjusting strategies within the context of academic pursuits.

Requirement

- Attendance and participation. Students are required to attend the class and encouraged to actively participate in class discussion and activities.
- Readings. Students are expected to have completed the readings assigned to them on the first day of class.
- In-class assignments. Students are expected to complete them and turn them in at the end of the class or at the time required by the instructor.
- Group oral presentation. Students are expected to collect information/literature regarding their own country's education p program, analyze them using theories/concepts learned in this course, and then conduct an oral presentation in class.

Evaluation

Attendance and participation (25%), in-class assignments (35%), group oral presentations (40%)

Textbook and reference (instructors will update the reading list on the first day of the class)

Cheng, K.-H., Lee*, S. W.-Y., & Hsu, Y.-T. (2023). The roles of epistemic curiosity and situational interest in students' attitudinal learning in immersive virtual reality environments. *Journal of Educational Computing Research, 61*(2), 494-519. https://doi.org/10.1177/07356331221121284

Ho, H.-N., & Liang, J.-C. (2015). The relationships among scientific epistemic beliefs, conceptions of learning science, and motivation of learning science: A study of Taiwan high school students. *International Journal of Science Education. 37*(16), 2688-2707. https://doi.org/10.1080/09500693.2015.1100346

Lee, S. W.-Y., Liang, J.-C., & Tsai, C.-C. (2016). Do sophisticated epistemic beliefs predict meaningful learning? Findings from a structural equation model of undergraduate biology learning. *International Journal of Science Education, 38*(15), 2327-2345. https://doi.org/10.1080/09500693.2016.1240384

Lee, S. W.-Y., Shih, M., Liang, J.-C., & Tseng, Y.-C. (2021). Investigating learners' engagement and science learning outcomes in different designs of participatory simulated games. *British Journal of Educational Technology, 52*(3), 1197–1214.https://doi.org/10.1111/bjet.13067

Li, M., Zheng, C., Liang, J.-C., Zhang, Y., & Tsai, C.-C. (2018). Conceptions, self-regulation, and strategies of learning science among Chinese high school students. *International Journal of Science and Mathematics Education, 16*(1), 69-87. https://doi.org/10.1007/s10763-016-9766-2

Pekrun, R. (2006). The control-value theory of achievement emotions: Assumptions, corollaries, and implications for educational research and practice. *Educational Psychology Review, 18*(4), 315-341. https://doi.org/10.1007/s10648-006-9029-9

Tsai, C.-C., Chuang, S.-C., Liang, J.-C., & Tsai, M.-J. (2011). Self-efficacy in Internet-based learning environments: A literature review. *Educational Technology & Society, 14*(4), 222-240. https://www.jstor.org/stable/jeductechsoci.14.4.222

Wang, Y.-J., Lee*, S. W.-Y., Liu, C.-C., Lin, P.-C., & Wen, C.-T. (2021). Investigating the links between students' learning engagement and modeling competence in computer-supported modeling-based activities. *Journal of Science Education and Technology, 30*(6), 751-765. https://doi.org/10.1007/s10956-021-09916-1

Wang, Y.-L., Liang, J.-C., & Tsai, C.-C. (2018). Cross-cultural comparisons of university students' science learning self-efficacy: Structural relationships among factors within science learning self-efficacy. *International Journal of Science Education, 40*, 579-594. https://doi.org/10.1080/09500693.2017.1315780

Pre-course reading and preparation (if any)

Please bring laptop or iPad for using Knowledge Forum and literature search.