

Course Description

MEDD8914 Implementing STEM/STEAM-rich Making: Opportunities and Challenges

| Course description | | |
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| <p>This course aims to develop students' knowledge of constructionism and maker culture to enhance their understanding of the theory and practice behind STEM/STEAM-Rich Making. Students will explore different approaches (e.g. assembly form of making, tinkering) in practical STEM/STEAM-Rich Making through hands-on activities. This module also critically examines the opportunities and challenges for implementing STEM/STEAM-Rich Making through SWOT analysis and funding proposal writing, as well as develops students' leadership in promoting and implementing STEM/STEAM education. School visits will be arranged, if possible.</p> | | |
| <p>Coursework / Examination ratio: <u>100</u> % Coursework, <u>0</u> % Examination</p> | | |
| Course learning outcomes (CLOs) | Aligned programme learning outcomes (PLOs) | |
| 1. To acquire knowledge about constructionism and making in STEM/STEAM education. | 2, 3, 4 | |
| 2. To analyse current situation to explore opportunities and challenges for implementing STEM/STEAM-Rich Making programmes. | 1, 2, 3 | |
| 3. To develop innovative STEM/STEAM-Rich Making programmes with the integration of appropriate pedagogies. | 1-5 | |
| Course assessment methods | | |
| Assessment method | Weighting (%) | Aligned course learning outcome(s) (CLOs) |
| 1. Moodle Task (e.g., SWOT Analysis) (Individual) | 25 | CLO 2 |
| 2. Presentation/workshop (Group) | 35 | CLOs 1-3 |
| 3. Essay (e.g., Literature Review, Reflective Essay, Proposal Writing) (Individual) | 40 | CLOs 1-3 |
| Course content and topics | | |
| <ul style="list-style-type: none"> • Global development of STEM/STEAM Education • Inclusive Maker and Making • Introduction of Constructionism, Tinkering and Making • Maker movement and Maker Space • Maker Education movement in Maker Faire • Local development of STEM/STEAM Education • Design Thinking and Computational Thinking • Holistic approach to school-based STEM/STEAM-rich Education • Workshops on SWOT analysis • Workshop on Funding Proposal writing | | |
| Required / recommended readings and online materials | | |
| <ol style="list-style-type: none"> 1. Rouse, R., & Rouse, A. G. (2022). Taking the maker movement to school: A systematic review of preK-12 school-based makerspace research. <i>Educational Research Review</i>, 35, 100413. 2. Ferretti, F., & van Lente, H. (2022). The promise of the Maker Movement: policy expectations versus community criticisms. <i>Science and Public Policy</i>, 49(1), 18-27. 3. Eckhardt, J., Kaletka, C., Pelka, B., Unterfrauner, E., Voigt, C., & Zirngiebl, M. (2021). Gender in the making: An empirical approach to understand gender relations in the maker movement. <i>International Journal of Human-Computer Studies</i>, 145, 102548. 4. Bar-El, D., & Worsley, M. (2021). Making the maker movement more inclusive: Lessons learned from a course on accessibility in making. <i>International Journal of Child-Computer Interaction</i>, 29, 100285. 5. Bevan B. (2017). The promise and the promises of Making in science education. <i>Studies in Science Education</i>, 53(1), 75-103. 6. Bevan, B., Gutwill, J. P., Petrich, M., & Wilkinson, K. (2015). Learning through STEM-Rich tinkering: Findings from a jointly negotiated research project taken up in practice. <i>Science Education</i>, 99(1), 98-120. | | |

7. Blikstein, P., & Worsley, M. (2016). Children are not hackers: Building a culture of powerful ideas, deep learning, and equity in the Maker Movement. In K. Peppler, E. R. Halverson, & Y. B. Kafai (Eds.), *Makeology: Makerspaces as learning environments* (Vol. 1, pp. 64–79). New York, NY: Routledge.
8. Herold, B. (2016, April 11). The maker movement in K-12 education: A guide to emerging research. Education Week. Retrieved from http://blogs.edweek.org/edweek/DigitalEducation/2016/04/maker_movement_in_k-12_education_research.html
9. Jackson, J., Charleston, L., & Gilbert, J. (2014). The use of regional data collection to inform university led initiatives: The case of a STEM education SWOT analysis. *Journal of STEM Education*, 15(1).

Other additional course information

Nil