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STEAM and Project-Based Learning: Equipping Young Women with 21st Century Skills

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Abstract : UTS STEAMpunk Girls is an educational program for young women (aged 12-16), to empower them to be more informed and active members of the 21st century workforce. With the number of STEM graduates on the decline, especially among young women, an additional aim of the program is to trial a STEAM (Science, Technology, Engineering, Arts/Humanities/Social Sciences, Mathematics), inter-disciplinary approach to improving STEM engagement. In-line with UNESCO's recent focus on promoting 'transversal competencies' in future graduates, the program utilised co-design, project-based learning, entrepreneurial processes, and inter-disciplinary learning. The program consists of two phases. Taking a participatory design approach, the first phase (co-design workshops) provided valuable insight into student perspectives around engaging young women in STEM and inter-disciplinary thinking. The workshops positioned 26 young women from three schools as subject matter experts (SMEs), providing a platform for them to share their opinions, experiences and findings around the STEAM disciplines. The second (pilot) phase put the co-design phase findings into practice, with 64 students from four schools working in groups to articulate problems with real-world implications, and utilising design-thinking to solve them. The pilot phase utilised project-based learning to engage young women in entrepreneurial and STEAM frameworks and processes. Scalable program design and educational resources were trialed to determine appropriate mechanisms for engaging young women in STEM and in STEAM thinking. Across both phases, data was collected via longitudinal surveys to obtain pre-program, baseline attitudinal information, and compare that against post-program responses. Preliminary findings revealed students' improved understanding of the STEM disciplines, industries and professions, improved awareness of STEAM as a concept, and improved understanding regarding inter-disciplinary and design thinking. Program outcomes will be of interest to high-school educators in both STEM and the Arts, Humanities and Social Sciences fields, and will hopefully inform future programmatic approaches to introducing inter-disciplinary STEAM learning in STEM curriculum.

Keywords : co-design, STEM, STEAM, project-based learning, inter-disciplinary
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