EXPERIENTIAL LEARNING FOR STEM FUTURES: DESIGNING TRANSFORMATIONAL MUSEUM EXPERIENCES TO DEVELOP YOUNG PEOPLE'S FUTURES THINKING

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PROBLEM

STEM education must prepare young adults (15-25) to address complex global challenges requiring futures thinking capabilities, yet traditional approaches often fail to develop these critical skills. Young adults are primarily concerned with identity exploration and belonging rather than long-term systemic thinking about STEM's role in shaping futures. How can experiential learning pedagogies in informal STEM settings scaffold futures thinking while engaging affective and transformational dimensions of learning to cultivate agency rather than despair about global challenges?

PLAN

Drawing on experiential learning theory and STEM education research, we developed a transformational pedagogy framework embedding six principles for cultivating authentic futures thinking skills and capabilities. Our approach integrated: (1) cognitive-developmental scaffolding for young adults, (2) dialogical learning through collaborative futures exploration, (3) two-way minded perspectives incorporating Aboriginal knowledges, (4) productive struggle through open-ended provocations, (5) experiential futures creating embodied learning through immersive scenarios, and (6) affective engagement cultivating hope and agency. We established Youth Advisory Boards and Future Themes Forums as authentic participatory mechanisms, ensuring learners co-designed STEM experiences from concept to implementation.

ACTION

Over six years (2018-2024), we implemented this framework across multiple exhibitions at MOD., including IT'S COMPLICATED (systems thinking), INVISIBILITY (AI and data privacy), SEVEN SIBLINGS FROM THE FUTURE (immersive 2050 scenarios), and BROKEN (alternative systems exploration).

Each experience embedded authentic learning through hands-on interaction with emerging technologies, reflective dialogue facilitated by trained facilitators, and affective engagement with possible STEM futures. Visitors suspended current reality to engage with speculative scenarios, requiring both cognitive and emotional investment in STEM problem-solving for future challenges.

REFLECTION

Visitors demonstrated increased comfort with uncertainty and expanded capacity to imagine diverse futures, though not all engaged with open-ended approaches. The interconnected nature of the six principles was key—experiential futures sparked curiosity, productive struggle encouraged conversations, conversations built belonging and belonging evoked hope. Key challenges included some visitors' resistance to ambiguous experiences. Future iterations would strengthen pathways for visitors uncomfortable with uncertainty while maintaining the productive struggle that drives deeper engagement. This approach offers a replicable framework for museums seeking to develop futures thinking capabilities in young adults.

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