NIDA

Network for Information and Digital Access

The impact of Science Literacy delivery methods - what works?

Strengths, Weaknesses and Gaps in impact assessment methodology

GROUP 4. Activities and services

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Mechanism	**Strengths & Weaknesses**	**Main gaps in the impact assessment (IA) methodology. Lack of (or insufficient):**	**Possible methodological improvement(s), recommendations and directions for future research**	**Reference**
30. Competitions				NO REVIEWS
31. Experiments	**Strengths** Not identified **Weaknesses** Not identified	- breadth and depth of IA methodology	- in order to truly assess the depth of the KIPPAS [a 6-category tool: Knowledge and Understanding; Inquiry Skills; Practical Skills; Perception; Analytical Skills; Social and Scientific Communication] outcomes, alternative assessment instruments besides the six aforementioned could be used to gain richer understandings of what students are thinking and how they construct meaning	**Learning Outcome Achievement in Non-Traditional (Virtual and Remote) versus Traditional (Hands-on) Laboratories: A Review of the Empirical Research** Brinson 2015
32. Makerspaces	**Strengths** - can increase engagement with STEM knowledge and potential in advancing interest in STEM careers, in particular for underrepresented populations - can foster the development and demonstration of 21st-century skills - can help cultivating creativity and innovation in universities and recasting the role of libraries and the impact they can have on local communities - can provide an opportunity for meaningful community engagement: acting as social spaces; supporting wellbeing; serving the needs of the communities and providing outreach centers for excluded groups	- empirical research evaluating makerspaces and making (Hsu, Balwin, and Ching 2017), and makerspaces and learning (Litts 2015; Marshall 2016) - formal methods and techniques to assess the outcomes of makerspaces (Gahagan 2016) - methods that capture the effects of makerspaces' service on users (e.g. qualitative data collected more formally to corroborate quantitative data and structure assessments)	- learning through making demands new forms of assessments since the current tools simply do not capture the complex interdisciplinary learning taking place in makerspaces - as makerspaces are proliferating, it is imperative for researchers and practitioners to build a better understanding of these spaces as learning environments and of the making that happens within them, develop appropriate tools of design, assessment and analysis (Litts 2015) and overcome many challenges that still exist in finding ways to measure the impact of informal learning environments (McCubbins 2016) - understanding the complexity of a makerspace warrants a mixed-method approach in order to capture, for instance, the vibrancy of the space	http://www.nida-net.org/en-gb/activities/connectwithscience/research/reports-and-bibliographies/makerspaces/

	Weaknesses - resource constraints can be challenging for makerspaces both in developed and developing countries - lack of teacher preparation, skill sets, expertise regarding how to use technology, pedagogical knowledge and limited access to technology and resources - can increase student anxiety - benefits available through makerspaces might not be evenly available		and the impact on participating students (Tomko et al. 2017) - improvements in the formalised approach to outcomes assessment could bring greater validity and reliability to the techniques being used, including clearly articulated objectives or intended outcomes, appropriate techniques and instruments, consistent approaches, scheduled frequency of the assessment and reporting (Gahagan 2016) - a learning-centered assessment according to learners' individual goals by using design stance, i.e. "makers' perspectives toward their making", could be used as an assessment tool (Litts 2015) - variations in learning amongst students present a challenging scenario for an assessment instrument but as well an exciting development for educators because they provide opportunities for peer teaching and models of leadership where all involved have knowledge to share (Blikstein et al. 2017)	
33. Mobile classrooms				**NO REVIEWS**
34. Mobile Laboratories				**NO REVIEWS**

Bibliography

Brinson, James R. "Learning Outcome Achievement in Non-Traditional (Virtual and Remote) versus Traditional (Hands-on) Laboratories: A Review of the Empirical Research." Computers & Education 87 (September 1, 2015): 218–37. https://doi.org/10.1016/j.compedu.2015.07.003.